Board of Registry
Biological Photographic Association, Inc.

Certification Program Guide

Sixth Edition

Dear Biological Photographer,

The officers of the Board of Registry are pleased to welcome you to the Registered Biological Photographer (RBP) Certification Program and Study Guide. We invite you to review the enclosed information and selected practical portfolio examples.

This is your opportunity to take advantage of the significant career possibilities and pathways for advancement that the Registry Program has to offer. Registered Biological Photographers enjoy a unique professional standing, enhanced profile, prestige and an extensive networking potential. In addition, a board certified biomedical photographer is recognized as professionally qualified by his/her peers, and has a definite employment advantage in a competitive job market.

Although there is no formal faculty or schedule to structure your efforts, the Board of Registry strives to assist and to certify every qualified photographer in the biological sciences, and is available in all aspects and stages of the process. Through the mentorship program, participating RBP's are also available to support your progress through the practical and oral procedures.

Self discipline, personal drive, and desire to improve skills and knowledge are required in order to complete the program successfully. Throughout the process you will find that your harshest critic will most likely be yourself. Having been in this position ourselves, we can assure that the goal is attainable, providing tremendous self-satisfaction, personal pride and professional recognition.

Congratulations on exploring the certification challenge. Welcome to the RBP Program ... mastering the biological image.

Sincerely,

The Board of Registry

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INTRODUCTION

The Certification Program

Certification by the Biological Photographic Association's Board of Registry leads to distinction as a Registered Biological Photographer (R.B.P.). This program is similar to board certification in the other professions of the science and health science field.

"R.B.P." after a person's name certifies that the registrant has proven his or her ability to perform professionally in a broad variety of photographic disciplines and that he or the possesses a theoretical knowledge of the field's materials, methods and techniques as well. The Certification Program consists of a three-part examination program:

Part One:	The Written Examination
Part Two:	The Practical Examination
Part Three:	The Oral Examination

The examination is designed for biophotographers employed in medicine, dentistry, forensic medicine, natural sciences, ophthalmology, and veterinary medicine; however, a photographer practicing in any specialty which relates to any aspect of life sciences would benefit greatly from the Certification Program.

Aim of the Program

The aim of the Certification Program is to establish standards by which a capable biological photographer can be internationally recognized. The examination is designed to permit the photographer to demonstrate competence. The examination program also serves as a criterion for an employer who requires the services of a skilled professional.

The Board of Registry

The Board of Registry is composed of twelve members elected by the membership of the Biological Photographic Association. Each member is elected to a four year term with three members rotating on and off the board each year.

The Board of Registry functions in accordance with the by-laws of the Biological Photographic Association and operates under its own Rules and Procedures. It is the responsibility of the Board of Registry to operate the Certification Program. This includes: day-to-day program functions, communication with candidates, program support efforts and revising and updating the program when necessary.

Examiners for the practical and oral portions of the program are appointed by the Board of Registry.

The Board of Registry elects a Chairman and Executive Secretary from among its members to direct the administration of the Certification Program. Members of the Board are appointed to serve specific functions such as Written, Practical and Oral Examination Coordinators. The Chairman of the Board of Registry also sits as a voting member of the Association's Board of Governors.

Eligibility for Enrollment

Applicants for certification candidacy must document for Board of Registry approval at least two prior years of biophotographic education, training, or professional work experience. Membership in the Biological Photographic Association is not required.

History of the Certification Program

In the formative years (1930's-1940's) of the Biological Photographic Association, the goal of board certification was much discussed, but deferred until the organization itself could become a stable professional forum. In the early 1950's, however, certification was an idea whose time had come.

In several special reports, and through the work of the Standards Committee, the larger questions began to be discussed -- Many levels of certification or just one? Technical knowledge only, or ethics as well? Registry of all qualified applicants, or only B.P.A. members? Realizing their responsibility to future applicants, the committee carefully studied each of the issues.

As decisions were made, and more information (such as membership surveys) came in, it became obvious that a registry program would soon be a reality. To guide the final progress, the Certification Committee was created in 1961. The members of this committee would become the first Board of Registry in 1964.

Procedures and methods for determining qualifications of applicants for certification were established with the consultative assistance of members of the:

American Medical Association
American Hospital Association
American Veterinary Medicine Association
American Dental Association

The four years labor of the Certification Committee represent the bulk as well as the brilliance of the effort toward today's program. They gained the support of the 12 most prestigious medical professional groups for the Certification effort, worked out a strict and convincing set of standards for "grandfather" certification of biophotographers, set up the rules and standards which govern the Board's conduct of examinations, and actually wrote the first examination and study guide.

In 1965, at the 35th Annual Meeting of the Biological Photographic Association, 47 persons were certified as Registered Biological Photographers, among them the first two certified by examination. Howard Tribe, Chairman of the Certification committee and thus the first Chairman of the Board of Registry, was certified as Registrant #1.

The Board of Registry has continued to operate effectively and influentially since then; certifying biophotographers by examination each year, continually evaluating and updating the certification program content and methods, and serving as a major resource to the profession.

Academic Credit for Certification in Biophotography

The Certification Program in Biological Photography has been reviewed and evaluated every four years since 1978 by the National Program on Noncollegiate Sponsored Instruction (NPONSI) under the auspices of the Board of Regents of the University of the State of New York. Each time the program has been designated for academic credit.

The National Program on Noncollegiate Sponsored Instruction, using several outside reviewers, evaluated each phase of the Certification Program for completeness, checks and balances, and assurance of professional competency. The review team "... felt that the Certification Program projects a very polished and professional image and that the requirements for completing it assure that only highly competent individuals will receive the designation of Registered Biological Photographer ...".

In consideration of the Certification Program's requirements and process, the National Program on Noncollegiate Sponsored Instruction has made the following recommendation for academic credit for successful completion of Certification:

Baccalaureate Degree:

12 semester hours in Basic Photography
6 semester hours in Photographic Theory
3 semester hours in Motion Media

Graduate Degree:

9 semester hours in Photography, Instructional Technology, or Media Technology

The details of academic credit recommendation can be found in the publication College Credit Recommendations -- The Directory of the National Program on Noncollegiate Sponsored Instruction (1994 Edition). While acceptance of the credit recommendation is at the discretion of individual institutions, 86% of institutions from whom credit for NPONSI certified programs has been requested have awarded credit and/or course exemptions.

Further information and assistance regarding academic credit recommendations may be obtained from:

The University of the State of New York
State Board of Regents
National Program on Noncollegiate Sponsored Instruction
Cultural Education Center
Empire State Plaza
Albany, NY 12230
(518) 434-0118

Certification Program Procedures

Each component of the Examination process (Written, Practical and Oral) has its own particular procedures which candidates must be aware of and follow. These procedures are detailed in the pertinent individual sections of this Guide.

Described below are the procedures which are concerned with the general operation of the Certification Program and most importantly with Program-Candidate interaction.

The Executive Secretary of the Board of Registry is the primary candidate contact. At various stages through the process the candidate will be in contact with the coordinator of each examination phase; the Written Examination Coordinator, the Practical Examination Coordinator and last, the Oral Examination Coordinator.

Should any decision of the coordinator(s) or examiners be questioned, an appeal may be made to the Board of Registry. (See below "Appeal or Grievance".)

Application and Fees

Enrollment in the Certification Program requires completion of an application form and payment of program fees. The total program fee is $200, which may be paid either in full at the time of application, or in two installments. If the fee is paid by installment, half is due at the time of application to the program. The remainder is due upon submission of the Practical Examination.

In addition to the required fees, an application must be accompanied by three current passport-type photographs.

Program Initiation, Milestones and Term

Upon acceptance of the candidate's application, the candidate is provided with the Certification Program Guide. As you peruse the Guide you will see that it includes an extensive study guide and bibliography to assist you in preparing for the Written Examination. A detailed description of all Practical and Oral Examination criteria is also included in this Guide.

Each stage of the examination process must be successfully completed before the candidate may proceed to the next stage. The Written Examination must by passed before

submission of the Practical Examination (portfolio) is allowed. The Practical Examination must be passed before the candidate may sit for the Oral Examination.

This however does not mean that candidates should delay initiating their efforts for any one component. Most candidates actually begin work on portfolio assignments while studying for the Written Examination. Similarly, most candidates are preparing their presentation for the Oral Examination while their Practical Examination portfolio is being graded.

Candidates are required to complete the Certification Program within 60 months of acceptance of their application.

Membership in the Biological Photographic Association

Candidates for certification as a Registered Biological Photographer are not required to hold membership in the Biological Photographic Association.

Each candidate will receive, regardless of their BPA membership status, the **BPA NEWS** during the time of their candidacy.

Candidates should be aware that the Board of Registry officially uses the **BPA NEWS** to communicate changes in the Certification Program, publish portfolio deadlines, and otherwise communicate with the body of candidates. This information may directly affect each candidate.

It is the responsibility of each candidate to stay in contact with the Board of Registry. The Board of Registry is seldom able to communicate with each candidate individually.

Mentorship Program

Upon successful completion of the Written Examination each candidate is assigned a mentor. Mentors are RBP's who are well acquainted with the current functioning of the Certification Program and an effort is made to identify a mentor within the candidate's geographic area. Your mentor will contact you throughout the year, offering technical and moral support.

Your mentor may be able to arrange access to that hard to find piece of equipment needed to complete an assignment. If your mentor is unable to provide specific assistance, he/she can put you in touch with RBP in your area who may be willing to help you with a particularly troubling exercise.

Special consultative aid is available to candidates if they have difficulty with some particular part of the program. Requests for this help may be directed to the Executive Secretary.

Appeal or Grievance

The Board of Registry of the Biological Photographic Association is governed by it's own Rules and Procedures. There is a section on appeals, within the Board of Registry's Rules and Procedures manual, which reads as follows:

Article V. Section H. Appeals to the Board of Registry

1. Any candidate in the RBP Certification Program who has a grievance concerning the Program should write a letter directly to the Chairman of the Board of Registry, setting out clearly the nature of the grievance, including any relevant history, dates of transactions, and copies of related documents or correspondence. This letter must be received within 60 days of the offense or it cannot be accepted.

2. The Chairman will notify the candidate that the letter has been received. The Chairman may act on the problem immediately or may choose to place the matter on the agenda of the next Board meeting.

3. The Board of Registry will discuss the issue. If lack of information makes a decision impossible, an investigative committee will be appointed. Ideally, this committee should complete its investigation at the annual meeting, otherwise the issue will be inevitably delayed. The Executive Secretary will represent the appealing applicant, unless he or she is personally involved in the dispute; in which case the Chairman will appoint some other member of the Board to speak in behalf of the appellant.

4. After the report of the investigative committee, the Board will discuss the matter further and come to a decision. The decision is final. The Chairman will notify the appellant in writing of the Board's decision.

Inscribing the Registry

The Executive Secretary of the Board of Registry is responsible for maintaining the Registry. This is the official list of all Registered Biological Photographers.

After the Oral Examinations are complete, the Executive Secretary inscribes the names of those candidates who have passed their oral examination into the Registry. The Chairman of the Board of Registry, the Executive Secretary, and three members of the candidate's oral examination committee will sign the candidate's Certificate. This certificate is affixed with the official Seal of the Biological Photographic Association.

Presentation of Certificates

Each successful candidate will be presented with a certificate recognizing that said individual is a Registered Biological Photographer.

This certificate is **awarded** by the Executive Secretary of the Board of Registry, the Chairman of the Board of Registry, and the President of the Biological Photographic Association, at the annual Honors Banquet of the Biological Photographic Association. The Honors Banquet is a chance for the Association's members to meet and congratulate the newly certified practitioners.

Every candidate is encouraged to attend the awards banquet. If circumstances prevent your attending, arrangements to obtain your certificate must be made with the Executive Secretary of the Board of Registry .

Publicity

All candidates are required to complete the enclosed press release form. The form will not be considered completed without the six required 3" x 5" photographs. These items should be given to the Executive Secretary prior to the Oral Examination.

The Executive Secretary will deliver the press releases and photographs of successful candidates to the Public Relations Officer of the Board of Registry. The Public Relations Officer will distribute the press releases to any local newspapers or media that you identify and to your employers.

Sample Portfolio Project

Immediately following a successful candidate's Oral Examination, the Chairman of the Board of Registry will review the portfolio to select assignments for inclusion in a sample R.B.P. portfolio. These samples are used for future study guide illustration, to assist in counseling future candidates, and in other publications promoting the certification program.

Interpreting this Program Guide

In preparing this, the sixth edition of the Certification Program Guide, the Board of Registry has tried to eliminate any ambiguity which could lead to confusion as candidates interpret the instructions and assignments.

As a candidate, remember that the Program Guide is just that, a guide. If you have a question as to the interpretation of the instructions or assignments, the Board of Registry recommends that you contact the appropriate officer or coordinator of the Board of Registry to receive clarification. Since these people change on a regular basis please contact the BPA main office to contact the current officer.

THE WRITTEN EXAMINATION

The candidate must have been accepted into the Registry Program by the Executive Secretary before sitting for the Written Examination. When the candidate is accepted into the program, the Executive Secretary will send the candidate's application to the Written Examination Coordinator (WREXCO) so that a file may be started for that candidate. The candidate will have an assigned Candidate Number which should be included in all correspondence with WREXCO. The WREXCO file will contain the candidate's application, all correspondence between the candidate and WREXCO and any answer sheets if the candidate has taken the exam previously.

The Written Examination consists of 120 multiple choice questions designed to test basic and specialized knowledge of photography including:

Materials and Processes	(10)
Photographic Chemistry	(10)
Photographic Optics	(10)
Theory of Light and Color	(10)
Applied Light and Filters	(10)
Photomicrography	(10)
Motion Media	(15)
Planning and Production	(10)
Terminology	(15)
Legal and Ethical Issues	(10)
Emerging Technologies	(10)

The candidate must contact WREXCO in writing at least 45 days in advance of the date that they want to take the exam. The exam may be taken only under the administration of the Chairman of the Board of Registry, or the Executive Secretary, or the WREXCO, or an approved Testing Service or University Testing Center. The Written Examination is given several times during the course of the year at international and regional meetings of the Biological Photographic Association.

If a candidate is unable to take the examination at a BPA sponsored site, it is the responsibility of the candidate to arrange and defray the costs for a Testing Service or University to administer the exam. The candidate must supply WREXCO with the name of a contact person at the Testing Center or University whom WREXCO can contact to explain how to administer the exam.

The exam is shipped to the test site via U.S. Registered Mail or Registered UPS to the test site. A cover letter will again list the testing procedure. The exam package will include the candidate's name, a photograph of the candidate, an exam, a blank answer sheet and a critique sheet. The test site must provide a secure, proctored environment to administer the exam.

When completed, the testing site should return the test to WREXCO via Registered U.S. Mail or Registered UPS. The Board of Registry will bear all normal costs associated with shipping the exam to the testing site, as well as return shipment.

Candidates have a maximum of 3 hours to take the exam. The candidate may use a simple electronic calculator and scratch paper. The candidate is not allowed to use any notes or other aids in taking the exam. Candidates are strongly encouraged to complete the critique sheet which accompanies the examination.

When the exam is returned to WREXCO it will be graded. It is the option of WREXCO to allow candidates to make telephone contact to inquire if the candidate passed or not. WREXCO will not give out the grade or a category by category score to the candidate over the phone for security reasons. WREXCO will contact candidates within 7 days in writing providing their overall score as well as category by category scores. The completed answer sheet will become part of the candidate file.

Failure to achieve a passing grade requires re-examination. There is a waiting period of 90 days before the candidate is eligible to take the examination again. When the candidate is ready for re-examination he or she again notifies the Written Exam Coordinator and the procedure is repeated with a different version of the written exam. Notification to WREXCO for re-examination must be accompanied with a $25.00 check made payable to the BPA Board of Registry for the re-examination fee. Each time the candidate is re-examined he or she will be taking a different test, as there are several versions of the written examination. The candidate is not being tested for his or her ability to finally get all the answers right on a specific test, but for his or her basic and specialized theoretical knowledge of biological photography.

Although the candidate may be working on the Practical Examination while studying for the Written Examination, the written phase of the examination process must be completed satisfactorily before the candidate may submit the Practical Examination to the Practical Examination Coordinator.

Written Examination Examples

The following sample examination questions are typical of those encountered on the Written Examination:

- A steeply pitched straight-line portion of a film's characteristic curve indicates an emulsion of:

a) Low contrast
b) High contrast
c) Low resolution
d) High speed

- Sodium sulfite is found as a component of most developers. One of its purposes is to prevent:

a) Evaporation
b) Oxidation
c) Over activity
d) Reduction

- Focusing at the hyperfocal distance results in:

a) Maximum depth of field
b) An unsharp image
c) Minimum depth of field
d) Small circles of confusion

- The accepted spectrum of human vision is:

a) 300nm to 800nm
b) 400nm to 700nm
c) 380nm to 600nm
d) 480nm to 780nm

- Light incident upon a subject which is neither transmitted nor absorbed is:

a) Reflected
b) Refracted
c) Dispersed
d) Diffracted

- In Köhler illumination, the image focused on the specimen plane is that of the:

a) Aperture diaphragm
b) Lamp filament
c) Field diaphragm
d) Substage condenser

- What is the standard NTSC video scan rate?

a) 24 frames per second
b) 30 frames per second
c) 30 fields per second
d) 60 fields per second

- The proper left to right sequence in an EIA full field color bar signal is:

a) Yellow, blue, green, magenta, cyan, white, red, black
b) Yellow, cyan, blue, magenta, green, black, red, white
c) White, yellow, cyan, green, magenta, red, blue, black
d) White, magenta, yellow, red, green, cyan, black, blue

- An independent circuit with a 30 amp circuit breaker can safely handle how many 1000 watt lamps at 110 volts?

a) 1
b) 3
c) 5
d) 7

- You are requested to photograph a patient in the supine position. You would fulfill this request by:

a) Having the patient lie face down
b) Having the patient lie face up
c) Having the patient stand facing the camera
d) Having the patient stand facing away from the camera

- There are no circumstances in which it is permissible to photograph a minor without the consent of a parent or guardian.

a) T
b) F

- A raster graphic:

a) can be enlarged without quality loss
b) is a mathematical construct
c) can be generated by scanning
d) all of the above
e) none of the above

THE STUDY GUIDE

This Study Guide has been prepared to help the RBP candidate study for the Written Examination. The directions for program participation and the study questions demonstrate the knowledge base required to pass the Written Examination. While these study questions cover a great deal of material, the actual exam may cover some information not mentioned in the Study Guide or referenced in the Bibliography. However, history shows that candidates who can answer a majority of questions found in the Study Guide, have greater success in taking the written examination.

BPA Workshops are also helpful for review purposes but there is no substitute for traditional study. A month before your test date take one hour each evening to work through study questions. Write out your answer to each question. In thirty days you will find yourself more than ready.

Materials and Processes

1. Describe the sequence of steps in the E-6 color process. Define the basic function of each of the steps. Know which steps have an effect on the speed of the film, the color balance, the maximum density, etc. Do the same for the C-41 process.

2. Define the term "user processed" as it relates to color film. Name films which fit this definition and those which do not.

3. Define the term "chromogenic". What color/B&W films/papers are of this type? Which are not?

4. Describe the origin and the use of the H&D curve and the meaning of the D Log E curve. How is the curve plotted, and what are the various points and sections of the curve? Show how a change in temperature, exposure, or development time would change the curve. Compare a D Log E curve for a negative and a positive film; for a high and normal contrast film.

5. Film can be subjected to many different detrimental conditions during processing. Describe as many of these conditions that cause harm to emulsions as you can.

6. Define the relationship between the density in processed emulsions and the exposure that material was given. What is the relationship between density and an increase in exposure of: 1 step, 2 steps, one-half step?

7. Describe the techniques used in "push" and "pull" processing. Give examples of situations in which these techniques would be used. Discuss the advantages and disadvantages of using these procedures.

8. Explain the use of couplers in image formation of color negatives and color reversal materials, as well as black & white films.

9. Define the terms: trend, crossover, D-min, and D-max as they apply to process monitoring.

10. Describe the care and handling of color and black & white control strips.

11. How do filters cause contrast grade to change in variable contrast papers?

12. Give a basic summary of the following processes: (a) diazo (b) diffusion transfer (c) stabilization (d) direct positive (e) color reversal (f) developer incorporated (g) vesicular
13. What differentiates a "lithographic" from a "high-contrast" material?

14. Describe the nature of the chemical reactions in silver halide photography and processing.

Photographic Chemistry

1. What photo chemicals, when combined, will produce hazardous conditions? Give examples.

2. Explain pH and how it is related to the various photo chemicals. What is the pH of water, fixer, and the common types of developers?

3. How will the pH variations of a developer affect film density?

4. Describe the chemical components of a common developer, a stop bath, and a fixer. Define the function of each chemical.

5. Describe the image that is present in an exposed, unprocessed, silver halide crystal. Explain the Gurney-Mott theory and the process which takes place when a latent image becomes developed.

6. Describe various developing agents. How can the developing agent used control the contrast of an emulsion.

7. Describe the storage conditions and techniques that would aid in the prevention of chemical oxidation. What chemicals in compounded formulas help prevent oxidation?

8. Describe chemicals and techniques that may be employed to reduce or intensify silver density in a developed emulsion.

9. Describe how the degree of developer dilution affects: (a) development time (b) contrast (c) exhaustion (d) grain (e) storage qualities.

Photographic Optics

1. How would you determine the required focal length of a lens for a defined magnification if you know the subject to film distance?

2. Describe the important aspects and optical considerations when imaging infrared or ultraviolet radiation.

3. What is the relationship between hyperfocal distance and depth-of-field?

4. Differentiate between depth-of-field and depth-of-focus and explain how they relate to circles of confusion.

5. Explain the terms "front nodal point" and "rear nodal point" as they relate to lenses. How are these points used in optical design, and what practical applications do they have for the working photographer?

6. Describe the various wavelengths and combinations of light for which lenses are corrected.

7. Explain how to calculate a new exposure when you increase magnification. Consider bellows extension, focal length, and working aperture.

8. At what point must you start compensating for bellows extension when photographing a subject at close range?

9. What are the advantages and disadvantages when you use small apertures? With regard to aberrations, explain the optical differences when you stop a lens down.

10. Photographing a subject with a 50mm lens would give you a certain image size on the film. At the same subject distance what effect would a 100mm lens have on the image size of the same subject? A 200mm lens?

11. What is the relationship between the aperture diameter, f-number and the focal length of the lens?

12. Explain the difference between real, virtual, and aerial images. Give examples of each. Describe the technique used to view an aerial image.

13. Sketch the following lens types: (a) plano-convex (b) concavo-convex (diverging) (c) bi-convex (d) bi-concave (e) concavo-convex (meniscus). Identify which of these form real images and which form virtual images.

14. Find the difference between the effective clear diameter of a lens and the relative aperture or f-number.

15. Give equations for finding each of the following when the others are known: (a) focal length (b) magnification (c) exposure factor (d) bellows (e) object distance.

16. What is the difference between a long-focal-length and a telephoto lens?

17. Describe the difference between "normal" lenses and "macro" lenses. Know the different types of macro lenses and their advantages and disadvantages.

18. Describe alternative techniques for using lenses at high magnifications.

19. Define "T-stop" and "pupillary factor". How do these relate to exposure?

Theory of Light and Color

1. Outline the basic properties of light, such as its method of travel, its speed and the effects of absorption, reflection, scattering, refraction, dispersion, and diffraction. Draw a diagram to illustrate each principle.

2. Explain briefly the factor determining the color of light and make a complete chart of the electromagnetic spectrum. Relate this to human vision, including colors and wavelengths of the various film sensitivities as well as the visual spectrum.

3. Describe the additive and subtractive systems of color reproduction using the terms primary colors, secondary colors, and complementary colors. Give examples where each system is used.

4. Make a diagram of a negative and reversal color material. Indicate each of the sensitive layers. Describe how the dye images formed after processing simulate where the original subject showed green, magenta, etc.

5. Describe briefly the Munsell® color system and define hue, value, and chroma. Compare the Munsell® system to the CIE® chromaticity diagram. Describe other color systems such as RGB and CMYK.

6. Define color temperature. Explain the Kelvin scale and mired values.

7. Explain the wave and particle theories of light travel and how each explains various photographic principles.

8. Outline briefly the Maxwell theory of color.

Applied Light and Filters

1. Construct a diagram that represents the sensitivities of monochromatic, orthochromatic, and panchromatic films. How do these curves compare to the sensitivity of the human eye?

2. What is the reciprocity effect? Describe the reciprocity behavior of film when it is given unusually high or low exposures. How can this behavior be compensated for?

3. When using panchromatic film, what filters would be used to eliminate red stains from showing in the copy photograph? Blue, magenta and green stains would be removed with which filters? What filters would emphasize these stains?

4. How is a grey card used and why has the 18% grey card been selected as the standard?

5. What are the transmission curves of these common filters: The Wratten® 47 blue, the Wratten® 25 red, the Wratten® 12 yellow? What other filters are in common use in biophotography?

6. What filters are used in infrared and ultraviolet photography? Describe their transmission characteristics and uses. What are barrier and exciter filters?

7. Describe "filter factors". How do you calculate filter factors when filters are used in combination?

8. Describe the use of a polarizing filter. How are these filters used in the most effective manner? How is polarized lighting set up on a copy stand?

9. What filters are used to convert the color temperature of a given light source?

10. What are the differences between color correcting, color balancing, and color printing filters?

11. What are interference filters, and how do they work?

12. What are dichroic filters, and how do they work?

13. What is the effect on color temperature of line voltage fluctuation applied to a high efficiency photo lamp?

14. How and why does the wavelength of actinic radiation affect contrast? Resolution?

Photomicrography

1. What is the difference between the simple and the compound microscope?

2. Define the parts of a compound microscope.

3. Describe the proper procedures in adjusting a microscope for Köhler illumination. Why is this the standard in photomicrography?

4. Describe alternate illumination (critical, darkfield, etc.) arrangements and their use.

5. Describe the various techniques employed to document transparent material (phase, interference, etc.).

6. How would you determine whether or not you had exceeded the magnification limitations of an objective? Define "empty magnification".

7. Explain refractive index. Draw a diagram to illustrate your explanation. What are the refractive indices of air, water, and immersion oil? With dry objectives, why is the highest magnification dependent upon the refractive index of air?

8. Which part of the microscope would you adjust to focus the field diaphragm at the specimen plane?

9. If the substage condenser were improperly focused, what effect would this have on the final quality of the image?

10. Define "working distance" in regard to the magnification of the objective.

11. The conventional microscope has two diaphragms. Describe the function of each and their adjustment.

12. What calculations are used to determine final print magnification using 35mm film? Using 4 x 5 film?

13. Explain the adverse effects extraneous light would have on the quality of a microscopic image. How can extraneous light be eliminated from the optical system?

14. Describe the difference between achromatic and apochromatic objectives. Explain the advantages and disadvantages of each. Give examples when you might prefer to use one over the other.

15. When using a panchromatic black & white emulsion, which type of objective would be best suited for the documentation of a monochromatic subject? A color subject?

16. What precautions must be taken to avoid diffraction?

17. The aperture diaphragm has an ideal diameter in relation to the objective aperture. How is this determined?

18. What does the prefix "plan" mean?

19. What are the basic considerations in the preparation of tissues for photomicrography? Consider thickness, coverslip, mounting media, and density of stain.

20. What would happen if you use an objective designed for a 170mm tube length on a 160mm tube length microscope?

21. What problems are encountered when using one manufacturer's objectives with another manufacturer's microscope? One manufacturer's objectives with another manufacturer's oculars?

22. Define what the various engraved letters and numbers mean on common microscope objectives.

23. Describe the optical difference of three commonly used condensers.

24. Describe the use of a stage micrometer to determine magnification.

25. Explain compensating eyepieces and why they must be used with specific objectives.

26. Describe various lighting arrangements for incident light photomicrography; for incident light photomacrography.

27. Describe phase-contrast, interference, polarized and fluorescence microscopy.

Motion Media

1. How is running time determined in 16mm film? Know how to calculate running time without the use of a footage/time chart.

2. Outline production methods for the following time base adjustment techniques: (a) animation (b) slow motion (c) high speed (d) time lapse.

3. Explain the term persistence of vision as it is related to cinematographic and video images.

4. What is the purpose of A & B rolling in editing? How is it accomplished?

5. What exposure compensation is necessary in changing from 24 fps to: (a) 64 fps (b) 32 fps (c) 16 fps (d) 12 fps? Why? When is this important?

6. List the commonly used scene transitions in motion media with regard to the passage of time and continuity. List two common mistakes which adversely affect continuity.

7. What are the major television color systems used throughout the world? What major countries use each system? Can the tapes be interchanged? How?

8. What is the standard impedance of video outputs? Explain "termination".

9. What is the scanning rate of video? How many lines per frame, lines per field, frames per second or fields per second are there? Explain the term "interlace scanning".

10. Explain the factors one must take into consideration when setting up lighting for video and other motion media as opposed to still photography.

11. What is the standard type of cable used to conduct a video signal? What are the common video connectors used?

12. What is the function of: (a) video tape control track (b) cue track (c) dual audio tracks?

13. Discuss the use of the following pieces of production and post-production equipment: edit recorder, edit player, special effects generator, timebase corrector, edit controller, waveform monitor, character generator.

14. Describe the principles of video editing and the two basic ways to edit a video program.

15. Explain why electronic editing is necessary with video tape.

16. Explain the term "skew". On what type of equipment would you find this control?

17. What information can be obtained by looking at a waveform monitor display? Compare this to a cross-pulse monitor and to a photographer's light meter. Why are both monitors important in video facilities?

18. Give a functional definition for the following video equipment: production switcher, routing switcher, synch generator, cross-pulse monitor, vectorscope, processing amplifier, distribution amplifier, film chain.

19. What are the essential parts required for connecting a small two camera studio to a videotape recorder? Define the terms "house synch" and "genlock".

20. What steps does a video cameraman take to balance a video camera for proper color reproduction under various lighting conditions?

21. What test signal is used to adjust a video monitor for correct color? Describe the proper technique.

22. What is the difference between a video monitor and a video receiver? How is a tape deck connected to each?

23. Define "tape format". List the common consumer and professional formats.

24. Discuss the differences between the following signal systems: composite, Y-C, RGB.

25. What is the "gain" setting on a video camera? What effect does a change in this setting have?

26. What is helical scanning? Why is it used in video recording?

27. What must be considered in transmitting a signal from one video source to several monitors? Receivers?

28. Describe "time code". Where and how is time code recorded in the various video formats? How can time code be used?

Planning and Production

1. What factors in audio recording determine your choice of tape speed, track configuration, track width and sync pulse frequency? What are the ANSI standards with regard to each?

2. Outline a procedure for planning an audiovisual production.

3. What are the aspect ratios of 16mm film, 35mm film slides, an 8 x 10 print and video?

4. How are the electrical terms amp, volt, and watt interrelated?

5. What is the standard type of cable used to conduct: (a) a monaural audio signal (b) a stereo audio signal? What are the common connectors used on each?

6. Identify at least four different types of microphones and four different types of microphone pickup patterns. When would each be used?

7. What are the basic camera movements and shot selections employed in film and video production?

8. Discuss various types of "shots" (e.g.: pan, zoom, tilt). How can these help in post-production?
9. Discuss methods and considerations in producing titles and graphics for video.

10. With regard to camera position, what precaution must be taken in order to prevent reversing talent position on the screen?

11. How do the following terms apply to audio signals: (a) amplify (b) attenuate (c) feedback (d) echo (e) reverberation (f) live room (g) dead room (h) intermittent (i) cross talk (j) static (k) 60 cycle hum?

12. How is the term impedance applied to microphones?

13. Explain how a tone generator is used to adjust audio levels.

14. Describe the method of recording projector cue signals on an audio track. What specifications and precautions are necessary when selecting equipment for recording and playback?

15. Discuss shooting techniques which are helpful in maintaining continuity and relationship.

16. Describe common screen formats for multi-screen presentations.

17. How is image placement in a specific position on screen ensured?

18. Describe the use of an edit decision list.

19. Describe the differences between on-line and off-line editing.

Terminology

1. Define "universal precautions", "isolation" and "reverse isolation".

2. List the major vertebrate body systems.

3. Explain the common separation and identification methods of molecular biology (e.g.: thin-layer chromatography, gel electrophoresis, Western blot).

4. Explain the structural and functional relationship between cells, tissues, organs and systems.

5. Define the different biological classifications (e.g.: order, species).

6. Define the words that are used to describe the various patient positions and anatomical views (e.g.: prone, AP, lateral, supine, flexion, extension, abduction, anterior).

7. Define the common root words that make up many medical terms: (e.g.: leuco, dermo, epi, lympho, hydro).

8. Describe "sterile" and "clean" conditions.

Legal and Ethical Issues

1. Explain why patient release forms are used. Describe the proper and improper use of these forms in regard to signatures of minors, animal owners, adults, and the mentally impaired.

Discuss the medico-legal implications. Under what circumstances may a patient be photographed without consent?

2. Discuss the issue of copyright. Describe the "fair use" doctrine.

3. Most employers have established policy concerning copyright, patents, self-employed work, employee indemnification and the liability for damage you may cause while employed. Discuss several possible policies, and their advantages and disadvantages.

4. Define patient privacy, and discuss how biophotographers are involved in this issue. Discuss the issues of medical records, right of access and copyright as they apply to clinical images.

5. Define the impact upon field photography of the Endangered Species Act.

6. Discuss the issue of image enhancement and image manipulation in the research setting.

7. Discuss safety issues in regards to hazardous substance or chemical handling. What type of training is required? When is training required? What are "Material Safety Data Sheets" and what purpose do they serve?

8. What requirements are observed in the handling of biologically hazardous materials?

9. Discuss safety and environmental issues in regards to disposal of chemical and biologically contaminated waste.

Emerging Technologies

1. Discuss electronic imaging devices and their various recording systems.

2. Describe the difference between analog and digital recording.

3. Describe common computer peripheral devices, especially those concerned with imaging (printers, pointing devices, etc.) and the devices that they interface with (ports, modems, etc.).
4. Describe the differences between raster and vector graphics.

5. Discuss the different types and operating characteristics of film recorders.

6. How is resolution of a electronic or computer based image quantified? Discuss different measurement types and the input/output devices that they relate to.

7. List and describe common file formats (TGA, TIFF, etc.), especially those with imaging applications.

8. Describe "aliasing" and "anti-aliasing". When are these issues considered?

9. What are the differences between computer display systems?

10. Discuss the relationship between image quality and computer memory requirement. How is this relationship defined mathematically? Calculate the memory requirements for an 8-bit color image; an 8-bit B&W image.

11. How are images input to a computer? Describe different methods and devices (frame grabbers, scanners, etc.). What methods are most appropriate for different subject/source types. Compare the resolution of different devices.

12. Define the terms: RAM, ROM, HIMEM, baud rate, access time, bus, OS, bit, byte, WORM, CPU, driver.

13. Discuss various data storage formats, devices and materials.

14. Discuss various imaging output and display devices (printers, recorders, monitors, etc.).

15. What types of satellites are used in television transmission?

16. Describe the differences between C-band and Ku-band satellite transmissions.

17. What are the major hardware components in a satellite broadcast?

BIBLIOGRAPHY

The following pages contain a listing of books and other publications which you may find useful in preparing for the certification examination process. **Do not feel that it is necessary to buy all or even any of these books. Most are available in libraries.**

The items are grouped as follows:

- General Photography
- Medical/Scientific/Technical Photography
- AV/Film/Video/Media Production

No effort has been made to make this listing all inclusive. However, considerable effort has been made to ensure that most publications listed are available at the time of this writing. **Unfortunately, some titles have been recently discontinued;** this includes many useful, classic, older books not listed here. You may wish to pursue some of these via library searches. They are often cited in the listed texts.

Generally the listing contains at least two publications covering a given subject. If one is not available try the obtaining the other.

In addition to the listed titles **(the most significant of which are indicated in bold type)** it is strongly recommended that candidates acquire and review an introductory college-level text in the following areas:

General Biology
General Chemistry
General Physics
Human and/or Comparative Anatomy
Physiology
Biological and Medical Terminology
Personal Computing

There is no substitute for original source material. Accordingly you may find useful and interesting the many articles published in the **Journal of Biological Photography** and the **Journal of Audio Visual Media in Medicine.** The Williams text -- **Medical Photography Study Guide** -- has a copious listing of references.

General Photography

Adams, A.	The Camera (NY Graphics Society)
Adams, A.	The Negative (NY Graphics Society)
Adams, A.	The Print (NY Graphics Society)
Brooks, D.	Photographic Lighting (HP Books)
Coote, J.	**Monochrome Darkroom Practice (Focal)**

Current, I. Photographic Color Printing (Focal)
Davis, P. Beyond the Zone System (Focal)
Eggleston, J. Sensitometry for Photographers (Focal)
Feininger, A. Light and Lighting in Photography (Amphoto)
Henry, R. Controls in B&W Photography (Focal)
Kodak E-59 Practical Densitometry (Kodak)
Kodak E-77 Kodak Color Films (Kodak)
Kodak F-5 Kodak Professional B&W Films (Kodak)
Kodak G-1 Quality Enlarging with Kodak B&W Papers (Kodak)
Kodak GA-11 Basic Printing Methods (Kodak)
Kodak J-1 B&W Processing Using Kodak Chemicals (Kodak)
Kodak KK-15 B&W Processing Using Kodak Chemistry (Kodak)
Kodak KW-12 Electronic Flash (Kodak)
Kodak KW-13 Using Filters (Kodak)
Kodak KW-15 B&W Darkroom Techniques (Kodak)
Kodak KW-16 Color Darkroom Techniques (Kodak)
Kodak KW-19 Advanced B&W Photography (Kodak)
Kodak M-1 Copying and Duplicating in B&W and Color (Kodak)
Kodak O-16 Professional Photographic Illustration Techniques (Kodak)
Kodak O-18 Photography with Large Format Cameras (Kodak)
Kodak Q-1 Basic Photography for the Graphic Arts (Kodak)
Kodak Q-3 Halftone Methods for the Graphic Arts (Kodak)
Kodak Q-7 Basic Color for the Graphic Arts (Kodak)
Kodak W-14U Photographic Chemistry in B&W and Color Processing (Kodak)
Kodak Z-22ED Basic Photographic Sensitometry Workbook (Kodak)
Kodak Z-99 Introduction to Color Process Monitoring (Kodak)
Kodak Z-128 B&W Film and Paper Processing and Process Monitoring (Kodak)
Langford, M. Basic Photography (Focal)
Langford, M. Professional Photography (Focal)
Ray, S. Applied Photographic Optics (Focal)
Sanders, N. Photographing for Publication (Bowker)
Shaman, H. The View Camera (Amphoto)
Stroebel, L. Dictionary of Contemporary Photography (Morgan & Morgan)
Stroebel, L. View Camera Technique (Focal)
Stroebel, L. Photographic Filters (Morgan & Morgan)
Stroebel, L. Photographic Materials and Processes (Focal)
Sturge, J. Neblette's Handbook of Photography and Reprography (Van
Sussman, A. The Amateur Photographer's Handbook (Crowell)
Todd, H. Photographic Sensitometry (Morgan & Morgan)
Vestal, D. The Art of B&W Enlarging (Morgan & Morgan)
Vestal, D. The Craft of Photography (Harper)
White, M. The New Zone System Manual (Morgan & Morgan)
Zakia, R. Color Primer I & II (Morgan & Morgan)

Medical/Scientific/Technical Photography

Abramowitz, M.	Contrast Methods in Microscopy (Olympus)
Abramowitz, M.	Microscope - Basics and Beyond (Olympus)
Angel, H.	The Book of Close-Up Photography (Knopf)
Angel, H.	The Book of Nature Photography (Knopf)
Blaker, A.	Field Photography (Freeman)
Blaker, A.	**Handbook of Scientific Photography (Focal)**
Bradbury, S.	An Introduction to Photomicrography (Royal Microscopical Society)
Bradbury, S.	An Introduction to the Optical Microscope (Royal Microscopical
Bradbury, S.	Dictionary of Light Microscopy (Royal Microscopical Society)
Breslow, N.	Basic Digital Photography (Focal)
Busch, D.	The Complete Scanner Handbook (Irwin)
Edgerton, H.	Electronic Flash, Strobe (MIT)
Gibson, H.	Photography by Infrared (Wiley)
Hansell, P.	Guide to Medical Photography (University Park)
Kodak B-3	Kodak Filters for Scientific and Technical Use (Kodak)
Kodak K-14	High Speed Photography (Kodak)
Kodak M-2	Using Photography to Preserve Evidence (Kodak)
Kodak M-27	Ultraviolet and Fluorescence Photography (Kodak)
Kodak M-28	Applied Infrared Photography (Kodak)
Kodak N-9	Basic Scientific Photography (Kodak)
Kodak N-17	Kodak Infrared Films (Kodak)
Kodak P-2	**Photography Through the Microscope (Kodak)**
Kodak P-11	Schlieren Photography (Kodak)
Kodak P-130	Basic Oscillography (Kodak)
Larish, J.	Understanding Electronic Photography (Tab)
Larish, J.	Digital Photography (Micro)
Lefkowitz, L.	Polaroid 35mm Instant Slide System (Polaroid)
Lefkowitz, L.	The Manual of Close-Up Photography (Amphoto)
McGavin, M.	Specimen Dissection and Photography (Thomas)
Moore, A.	The Imaging Glossary (Telecom)
Morton, R.	Photography for the Scientist (Academic)
Ploem, J.	Introduction to Fluorescence Microscopy (Royal Microscopical
Russ, J.	Image Processing Handbook (CRC)
Time-Life	Photographing Nature (Time-Life)
Time-Life	Photography as a Tool (Time Life)
Time-Life	Special Problems (Time-Life)
Sun Microsystems	Introduction to Computer Graphics Concepts (Addison-Wesley)
Vetter, J.	Biomedical Photography (Focal)
Williams, A.	**Medical Photography Study Guide (MTP Press)**
Williams, J.	Image Clarity (Focal)

AV/Video/Film/Media Production

Alkin, G. Sound Recording and Reproduction (Butterworth)
Anderson, G. Video Editing and Post-Production (Knowledge Industry)
Cheshire, D. The Book of Movie Photography (Knopf)
Cheshire, D. The Video Manual (Van Nostrand)
Kodak H-2L Cinematographer's Field Guide (Kodak)
Kodak H-6L Complete Animation Book (Kodak)
Kodak H-23L The Book of Film Care (Kodak)
Kodak S-12L Images, Images, Images (Kodak)
Kodak S-30L Slides - Planning and Producing Slide Programs (Kodak)
LeTourneau, T. Lighting Techniques for Video Production (Knowledge Industry)
Lipton, L. Independent Film Making (Simon & Schuster)
Medoff, N. Portable Video (Knowledge Industry)
Nelson, M Basic Audio Production (Knowledge Industry)
Oxberry The Oxberry Slide Handbook (Oxberry)
Utz, P. Today's Video (Prentice Hall)
Wells, M. Special Effects Techniques for Film and Video Production (Knowl
Wurtzel, A. Video Production (McGraw Hill)

THE PRACTICAL EXAMINATION

Introduction

At any time after successful completion of the first phase of the Examination Program, the Written Examination, the Practical Examination portfolio may be submitted for grading. You, of course, may be working on the various assignments of the Practical Examination while studying for the Written Examination.

The purpose of the Practical Examination phase of the Certification Program is to allow the candidate to demonstrate his or her ability to perform a wide variety of biophotographic assignments in a professional manner. These assignments should be approached and completed with the same level of attention that you would give to a request from a client or a specification from your supervisor.

The Practical Examination consists of **18 required assignments** developed to assure demonstration of core techniques and practical knowledge required by biophotographers. In addition you will select **12 elective assignments** from an extensive listing of possibilities. The elective assignments will enable you to demonstrate any particular areas of specialized expertise or experience that you may have developed.

The thirty assignment portfolio will be graded throughout for your ability to perform each and every assignment in a competent manner and to present the assignments professionally. 17 of the 18 required assignments, and 11 of the 12 elective assignments must be passed to satisfactorily complete the Practical Examination phase.

Practical Assignment Instructions

What follows is a set of instructions that must be followed in preparing and submitting your Practical Examination portfolio for grading. Careful attention to the details of these instructions and to the details of each individual assignment will greatly ease this phase of the examination procedure.

-- All work must be done by you. The only exceptions to this are the processing and printing of color materials and motion picture films. You are however held responsible for the finished quality of any materials produced for you, in that you have judged their quality as acceptable.

-- When a specific subject is not specified, you have the opportunity to choose any appropriate subject material that will satisfy the purpose of the assignment. When a specific media or technique is not specified you may choose to execute an assignment using any media or technique which falls within the broad parameters listed below.

-- Each assignment must be organized as a single unit in sequential viewing order. Each unit will include: a data sheet, all negatives, transparencies and prints. (Do not include bracketed or duplicate exposures.)

-- It must be possible for examiners to remove negatives or transparencies for detailed inspection. Examiners will often project transparencies or make prints from your negatives in order to assist in judging the quality of the finished assignment.

-- When an assignment requires submission of projection transparencies you must submit slides which can be projected in a standard 35mm slide projector. Projection transparencies must be mounted in cardboard or plastic mounts. Transparencies mounted in glass are not acceptable. The mounts must be labeled with the assignment and candidate numbers and have an orientation mark placed in the lower left corner when viewed correctly.

-- Larger format transparencies should be submitted only for assignment E49 or when an assignment allows you to select the medium of presentation. Transparencies should be sleeved for viewing on a light box and must have an orientation mark placed in the lower left corner when viewed correctly.

-- Prints must have an **image area** between 4.5 x 6.5 inches and 5.0 x 7.0 inches. (Note: The only exception to this sizing requirement are the multiple prints required for assignment E28.) Multi-print assignments are to contain separate images, each of which must fulfill these size specifications. Multiple prints must be presented so that they can be viewed and graded together.

-- Prints should be produced for optimum viewing in a brightly illuminated area (100 footcandles). Submit the best prints that you can make from your negatives. Prints should contain clean whites, dense blacks and appropriate tone or color ranges. Details should be visible in both the highlight and shadow areas of the image. (Please note that inadequate print quality is a common problem for candidates.)

-- Requested magnifications should be calculated for **final print magnification**. Accompanying projection transparencies must cover approximately the same field as the print.

-- Slide-Tape submissions must contain 35mm slides loaded in proper sequence in a standard Carousel® type tray. The audio portion of the program must be submitted on a standard audiotape cassette which must be programmed on Track 2 to inaudibly advance the projector using the ANSI standard 1KHz pulse advance frequency.

-- 16mm is the sole acceptable motion picture film format. The film may have a soundtrack or may be silent. Silent submissions must be accompanied by a narrator's script. A good quality, edited, workprint will be acceptable.

-- Videotape submissions must use NTSC signal and may be in either standard U-matic or standard VHS formats. (Please note that while VHS is perfectly acceptable as a release medium, candidates will be held to a professional level production standard.)

-- Candidates who wish to submit assignments in formats or media other than those listed above or in the specific assignment instructions must obtain permission in advance of submission from the Practical Exam Coordinator (PRAXCO).

-- The data sheet which accompanies each assignment submission should be completed as carefully and thoroughly as possible. If an item on the data sheet is not applicable, please mark it so (N/A). **Failure to include required information on the data sheet will result in that assignment being ruled incomplete.**

-- It is recommended that nothing within your Practical Examination portfolio reveal your name or the identity of your institution. All items that will be seen by examiners should be labeled only with your candidate number. At your discretion, you may wish to leave your name in the titles or credits of completed productions or materials if you are willing to sacrifice anonymity.

-- You are responsible for presenting the assignments and packaging your Practical Examination portfolio in a professional manner. Please remember that each assignment will be unpacked, examined and reassembled not less than 10 times in the course of the examination process. Clean, clear, neat, consistent and convenient assembly of the materials is taken into consideration by the examiners.

-- Prior to shipping you are required to document each completed assignment by making **three 35mm copy transparencies or slide duplicates and a copy of the data sheet for each assignment**. Each transparency mount must be labeled with the assignment number and your candidate number. It is also required that you retain copies of any videotape, motion picture or slide-tape materials that you submit.

Shipping of the Practical Examination

Practical examinations must be received and ruled complete by the Practical Examination Coordinator no later than January 15 in order to guarantee an opportunity for eligibility to sit for the Oral Examination during that calendar year. Notify PRAXCO before you intend to ship your portfolio.

Your Practical Examination portfolio will be shipped a minimum of nine times in the course of the examination process. Accordingly, it should be packaged with sufficient protection to maintain its original quality. **Standard photograph shipping cases with the dimensions of 16 x 20 x 4 inches are required. Portfolios needing additional space to fit all materials will be accepted in a 20 x 20 x 4 inch case where such a need can be demonstrated.**

In addition to the assignments, please include the following in a separate envelope within your shipment: **two sets** of the 35mm copies of all assignments sleeved in plastic slide sheets (20/sheet); **a signed, witnessed statement attesting to your production of the enclosed assignments (see below)**; a stamped, self-addressed postcard for the Practical Examination Coordinator to return as acknowledgement of receipt; a listing of your current addresses and telephone numbers for voice and facsimile communication. Allow enough space in the shipping case for PRAXCO to add the Examiners' evaluation materials (approximately 9 x 12 x 0.25 inches).

Ship your Practical Examination portfolio to the Practical Examination Coordinator using a carrier that provides insurance and a tracking system. The Board of Registry will insure your portfolio for $500.00 and you should do the same. All reasonable care will be taken in the handling and shipping of your Practical Examination portfolio, but neither the Biological Photographic Association, Inc.; the Board of Registry; or its assignees will be liable for any loss or damages.

Your shipping/insurance receipt, your copy of the documentation slides and the data sheet copies will serve as proof of shipment should a problem arise with the carrier(s).

Candidate's Statement

"I, the undersigned, do certify that, except where noted on assignment cover sheets, the enclosed practical examination assignments represent work which I have personally completed."

"I further understand that misrepresentation of these assignments may lead to denial of certification or disqualification should proof of such misrepresentation be presented to the Board of Registry of the Biological Photographic Association, Inc.

Name: _____

Candidate #: _____

Address: _____

_____

Signature: _____

Date: _____

Witness: _____

Signature: _____

Date: _____

Evaluation

Upon receipt the Practical Examination Coordinator will open your Practical Examination portfolio remove the documentation slide set and the witnessed statement and place these in the permanent files of the Board of Registry. PRAXCO will then verify the assignment count and inspect each assignment for obvious errors or omissions. **The Practical Examination Coordinator will declare the examination incomplete if any assignment does not satisfy the specified requirements.** If an examination is declared incomplete, PRAXCO will immediately contact the candidate with instructions for required action(s).

Once an examination has been ruled complete, PRAXCO will remove any remaining identifying markings, repack the portfolio and send it to a Regional Examination Coordinator (RECO). RECO is responsible for assembling a panel of five examiners (RECO may be one of

the five) who will grade your Practical Examination. Each of the examiners is an RBP who has attended at least one Practical Examiners' Workshop. RECO is responsible for keeping track of your examination at all times and ensuring that the evaluation process proceeds on schedule.

The 18 required assignments and the 12 elective assignments of the Practical Examination are to be prepared by you as a demonstration of the best work that you are capable of producing. The five examiners grade your work independently and confidentially. You are known to the examiners only by your candidate number. Likewise, you will not know who the examiners are.

When grading, the examiners are instructed to look at the assignments with the following points in mind:

1. Fulfillment of the purpose of the assignment and adherence to assignment specifications.

2. Knowledge and understanding of the subject and the techniques necessary to produce a good illustration or portrayal of the selected subject.

3. Photographic ability in composition, lighting, choice of materials, proper equipment utilization and proper technique in processing, printing, finishing or other efforts.

4. Quality and presentation of the finished assignments and portfolio as a whole.

Aggregate scores are determined by the examiners for each assignment based on the criteria listed above and the specific assignment grading specification.
Final scores for individual assignments reflect the following judgement:

100 to 90	Excellent, outstanding work
89 to 80	Very good work, minor faults
79 to 70	Fair to marginal work
69 to 60	Not acceptable
59 to 0	Extremely poor work, not the assignment called for.

Each examiner records his or her scores for each assignment as well as comments. The grading sheets are forwarded to RECO and PRAXCO and the portfolio is shipped to the next examiner. The fifth examiner ships the portfolio to PRAXCO upon completion.

PRAXCO assembles the grades from each of the five examiners, discards the high and low score for each assignment and then averages the three remaining scores to arrive at a final grade for each assignment. **70 is a passing grade.**

Assignments which have not received a passing grade may be redone and resubmitted. PRAXCO will provide the candidate with instructions regarding resubmissions. Each resubmission effort must be accompanied by a $50.00 fee.

The Practical Examination Coordinator returns your examination portfolio to you accompanied by a list of the final assignment grades and a distillation of the examiners' comments. **To complete the Practical Examination phase of the Certification Program you must pass 17 of the 18 required assignments and 11 of the 12 elective assignments.**

Instructions for Data Sheets

It is very important to fill out the data sheets as completely as possible. What the candidate may feel is too much information, is often quite useful for the Practical Exam Graders. Remember, the exam is designed to provide the candidate with a lot of latitude in deciding specific subjects and especially approaches to photographing them. The more a grader knows about why a subject was chosen, or why a specific technique was used, or even equipment or subject limitations, the more informed and accurate their grading can be. It can also be of benefit to the candidate: if there are problems with the assignment, it will be easier to provide guidance for remaking it. If something was done unconventionally, explain why. Use the "remarks" section, or a separate paper. In most cases, there is certainly more than one acceptable approach and why one approach was chosen over another can influence grading. A poor assignment can never be "explained away;" the final result is what matters the most. Does it meet the requirements of the assignment? Is the result professional? Would you give this to your most important client?

The following is a brief guide to what is expected in the data sheets, skipping the obvious. More is usually better.

Description of Assignment: Assignment as written in the guide, including description of subject.
Diagnosis: Describe any pathology involved - if the subject is normal, state that it is normal - the graders need to know what they are looking at!
Magnification: VERY IMPORTANT! Explain how magnification was arrived at, include supporting evidence and formulae used.
Imaging Equipment: Photographic equipment used - cameras, microscope or macroscope make (include any peripheral equipment attached), bellows, supports, gadgets.
Lighting Description: Lighting equipment and technique used.
Optical Data: Lenses used, including integral lenses on specialty equipment - identifying characteristics, such as PlanApo and N.A. on microscope lenses and condensers, video lenses, and any filtration data.
Printing Equipment: Enlarger type, enlarging lenses, special processors.
Outside Assistance: It is not against policy to elicit outside help, as long as the work is yours. Examples include outside color labs doing your color printing, or someone assisting on location under your direction.
Remarks: VERY IMPORTANT! Include anything you feel is relevant to a fair grading of your assignment. Make sure the graders do not have to assume anything. For example, explain processing which deviates from published "norms" or how exposure was determined. Everything is important.

DIGITAL DATASHEET
(use this data sheet in addition to the regular sheet for all digital assignments)

Platform: Type of computer, RAM, special cards, accelerators, etc.
Capture Device: Type and make of scanner, digital camera (including optical data), etc.
Output Device: Film recorder, printer, image setter, etc.

Capture Software: Scanning software, whether provided with hardware or third party, provide input resolution.
Image Processing and Enhancement: Software used for image manipulation.
Output Software: Any special software for output, such as drivers for film recorders, queues, etc., also output resolution and use of any compression schemes such as JPEG, PCXor GIF
Remarks: VERY IMPORTANT! Include anything you feel is relevant to a fair grading of your assignment. Resolution issues are important - why did you use your stated resolutions? There is quite a lot of computer detail that is not specified on this sheet. The more you can explain how your system works, the more the graders will know you understand the process.

RBP Datasheet

RBP - Registered Biological Photographer Candidate Number: _____

Assignment Number: _____

Description of Assignment or Subject: _____
_____
_____

Diagnosis: _____ Tissue Stain: _____

Magnification (including calculations/formulae):
_____
_____

Photographic Data

Imaging Equipment:_____
_____

Lighting Description: _____
_____

Optical Data: _____
_____

Printing Equipment: _____

Negative Material: _____ Exposure: _____

Processing: _____

Printing Material: _____ Exposure: _____

Processing: _____

Transparency Material: _____ Exposure: _____

Processing: _____

Outside Assistance: _____
_____
_____

Remarks: _____
_____
_____
_____
_____

RBP Datasheet for Digital Assignments

RBP - Registered Biological Photographer Candidate Number: _____

Assignment Number: _____

Description of Assignment or Subject: _____
_____
_____
_____

Hardware Data

Platform, including CPU information (Mac, PC, other): _____
_____

Capture Device: _____

Output Device: _____

Other Relevent Peripherals: _____
_____
_____

Software Data (note versions)

Capture: _____

Image Processing and Enhancement: _____
_____

Output: _____
_____

Other Relevent Software Used:
_____
_____
_____

Outside Assistance: _____
_____
_____

Remarks: _____
_____
_____
_____

Required Assignments

R1

A photomacrograph x10 to x25 of a transparent subject which requires bright field illumination. The purpose of this assignment is to demonstrate your knowledge of the techniques of photomacrography. Produce an original black & white negative, a black & white print of the required magnification and a color projection transparency of the same field. Include a scale bar on the print for reference. A compound microscope MAY NOT be used.

R2

Two photomicrographs of the same transparent subject which requires bright field illumination. The purpose of this assignment is to demonstrate your knowledge of the filtration, film, processing techniques and the magnification calculations associated with photomicrography by producing a matching pair of black & white prints. Indicate magnification by the addition of a bar scale upon each print. The area from which the higher magnification is taken must be indicated in the lower magnification print.

-- A low power photomicrograph xl00 to x200
-- A high power photomicrograph at a magnification four times that of the low power photomicrograph

R3

Prepare a written paper describing a photographic procedure, an original photographically related research or the comparison of photographic materials. Length must not be less than 500 words. The purpose is to demonstrate your ability to organize and express yourself in writing and convey knowledge to other photographers. The topic you choose must contain photographic or graphic support. Submit all the photographs and diagrams as you would to a publisher (see J. of Biological Photography, 50:4, October 1982, p. 127; or consult a recognized source book on writing technical papers).

R4

As a media producer, demonstrate the various steps involved in the planning and preparation for a single-concept or self-instructional production. The medium you choose to plan for is optional. Use an actual or a hypothetical production parameter.

-- State purpose and audience level of the production.
-- Develop a script and story board outline of the production.
-- Present the production schedule and other pertinent details.
-- Prepare a production cost analysis including the specific personnel expertise and vendor services necessary to complete the production.

The actual production is not a requirement of this assignment; however, if the production described in the plans has been produced, it may be submitted as assignment R5, E53 or E59/60.

R5

Submit a simple motion picture or videotape in which you controlled the lighting, operated the camera and edited the production. State the audience level and purpose. This assignment should be completed using single camera and editing techniques. It should contain opening and closing graphics with multiple scenes in between. The purpose of this assignment is to demonstrate your ability to tell a story using motion media. Total screen time must not be less than five minutes. (Note: see E53 for submitting complex motion media in which you played a single role on a production team.) Silent submissions must contain a narrator's script. Submissions must be on 3/4 inch U-matic or 1/2 inch VHS NTSC formats.

R6

Photograph transparent glassware, with or without liquid, set up in an appealing arrangement. The purpose of this assignment is for you to demonstrate lighting techniques used for glassware and your creativity. Produce a black & white print and a color projection transparency.

R7

A lighting comparison of a small lesion or damage to a biological subject. Produce two color prints with obvious lighting differences. Indicate size of the lesion by the addition of scales. The purpose is to demonstrate your control of standard lighting techniques.

-- Texture lighting to best demonstrate the anomaly.
-- Flat or soft lighting, which does not emphasize the anomaly but best demonstrates its color.

R8

Large subject approximating the size and convolutions of the human body. The purpose of this assignment is to demonstrate abilities in the selection and control of backgrounds, choice of proper lenses and selection of a suitable lighting system. The lighting may be somewhat different on the two views, but the two black & white prints must be of the same print quality.

-- Full length of the subject.
-- Medium close-up to illustrate pathology or salient feature. This view must be visible in the full length photo.

R9

Produce a series of sequential color projection transparencies (four is the minimum) of a surgical or biological procedure - for example; corrective surgery, ophthalmic procedure, autopsy, investigative or experimental work. The purpose of this assignment is to demonstrate your ability to tell a story using still media while adhering to sequential photographic techniques.

R10

Photograph a bone specimen, with all soft tissue removed, to demonstrate texture, depth and size (e.g.: skull, femur, mandible, tooth, shell, vertebra). Produce a black & white and a color print of the same subject. The purpose is to demonstrate your ability to control lighting for illustrating a subject both in black & white and in color. Include a scale on both prints.

R11

Demonstrate flat, moist specimen photography techniques by cutting an orange in half and photographing the entire freshly sliced surface to illustrate its membranous structure. The purpose of the assignment is twofold:

-- First, to show your ability to photograph gross specimens with special attention to specular highlight control
-- Second, to show your ability to convert color slides into publication prints.

Submit a color slide, an internegative, and a black & white print.

R12

Demonstrate a comparison of infrared or ultraviolet differentiation versus conventional photographic techniques of the same subject (e.g.: chlorophyll distribution, blood oxygenation, or document alteration). The purpose is to disclose information which is not visible using conventional photography. Photography of visible light fluorescence is not acceptable. Produce in the medium of your choice, and explain techniques on the data sheet.

R13

Photograph a gradient subject (e.g.: culture plate, electrophoresis plate, gel rod(s), precipitation tube). The subject you choose should be one that will enable you to demonstrate the purpose of this assignment, which is to photographically enhance the subject's informational content. Produce a record print to demonstrate the subject without enhancement. Produce a second print which demonstrates the enhancement method. Describe the enhancement technique on the data sheet.

R14

A photomacrograph of a small, highly reflective subject (e.g.: everyday instrument, gold or tyconium casting, skin scraper, insect, or small snail shell). Produce two black & white prints from the same perspective. The purpose of this assignment is twofold:

-- First, to demonstrate the techniques of photomacrography
-- Second, to demonstrate the lighting control of a reflective subject.

Produce two photographs. First show the entire subject at an appropriate magnification. In a second negative, at a magnification 5 to 10 times that of the first view, show a detail of configuration, deterioration or wear.

Rl5

Photograph a mechanical trace such as EKG, seismograph or a specially prepared graph on grid paper. The original must be publication ready, containing information such as dates, timings or labeling. A printer must be able to reproduce both your prints without the use of a screen. A specially prepared graph should be substituted only if a mechanical trace is not available. Produce two black & white prints:

-- Grid lines retained
-- Grid lines dropped

Submit the original subject. The purpose of this assignment is to demonstrate your knowledge of filtration and photographic reproduction techniques.
R16

Photograph a radiograph requiring enhancement in order to reproduce the original informational content. Submit the original radiograph, which must contain obvious under- or overexposure, stain or other defects. Produce a black & white print and projection transparency. Describe your enhancement technique(s) on your data sheet. The purpose is to demonstrate your ability to use various enhancement techniques in order to produce an acceptable reproduction.

R17

Produce two portraits of the same person:

-- Conventional head and shoulders studio portrait.
-- Working portrait, showing the subject in a job-related environment.

Submit black & white prints. The first print will be graded for portrait techniques. The second print will be graded for your ability to create a portrait with public interest. These photographs should be produced as though they were to be used in a public relations brochure. The purpose is to demonstrate your knowledge of standard portrait techniques.

R18

Produce and submit three computer generated graphics in which you operated all the input functions; making design, color and legibility decisions.

The format and content of the first two graphics is left to the candidate's discretion. The third graphic must be a table of numerical information with a title, subtitle and three columns.

The graphics must be submitted as projection transparencies of at least 2000 line resolution. Submit a one page written paper describing the system you used and how the image transfer was accomplished. (A service center may image the graphics, but you must describe the technology that the bureau used.) The purpose is to demonstrate your knowledge of computer graphic production.

Elective Assignments

El9

Photograph the external eye to include the lateral palpebral canthus, the medial palpebral canthus and the complete limbal margin, at x4 on the final print. Produce a black & white print. The purpose of the assignment is to demonstrate your control of depth-of-field, lighting, exposure and printing techniques.

E20

Photograph a stained blood smear using an oil immersion objective in order to demonstrate white blood cell morphology. The purpose of this assignment is to demonstrate your knowledge of photomicrographic techniques, filtration, and ability to select a photographic quality smear. Produce a black & white print. Place a scale bar on the print for size reference.

E21

Produce two photographs of a small opening where the area of interest is a depth two times greater than the diameter of the opening (e.g.:barred cage, insect trap, beehive interior, underground habitat of a rodent, wall safe, aquarium, intraoral view). Produce in medium of your choice to show a general appearance view and a detail at the area of interest inside the cavity. The purpose is to show your ability to light the subject and produce two images that tell a story using orientation and detail.

E22

Photograph a spherical subject so that it appears round to demonstrate form, giving emphasis to texture (e.g.: head of cabbage, pestle, moulage, tennis ball. Produce a black & white or color

print. The purpose is to give the feeling of three-dimensionality while creating a two-dimensional photograph.

E23

Two photographs of a defined area (e.g.: mosquito breeding ground, homicide scene, environmental change, living mammal in its natural habitat, ecozone boundary). The purpose of this assignment is to show your ability to tell a story using orientation and information detail to inform an observer. Produce in medium of your choice.

-- General view
-- Close-up of detail located in the general view

E24

Produce two black & white photographs using a view camera. In one image leave the camera's standards in the zero position (record print). With all other variables the same, use the swing and tilt mechanism in the second image to improve the photograph. The subject is your choice but should be selected to best demonstrate the capabilities of view camera adjustments. The purpose of this assignment is to demonstrate your knowledge of view camera operation, lighting, and print quality.

E25

Photograph a cartilaginous, bone or similar subject (e.g.: thorn, claw, bill, beak, fingernail, tooth). Photograph at x3 on film (include a scale in the negative) to show surface detail, ridging, thickening or color change. The purpose is to demonstrate sharpness, texture and shape with a subject in the photomacrographic range. Produce a black & white print. The scale does not have to appear in the print.

E26

Photograph the tongue of a living subject. The purpose is to demonstrate sharpness, texture, and shape of the subject using lighting. Note magnification on data sheet. Produce a black & white or color print.

E27

Produce a photograph showing the range of motion depicted by the limits of movement of a body part, the limits of exploration of some animal subject or the limits of movement of some machine or device. Produce a single print made by multiple exposure on film or double printing

techniques. The purpose of this assignment is to demonstrate your control of lighting and exposure while adhering to standard technique.

E28

Prepare a composite of the nine cardinal eye positions of gaze of a patient. Produce black and white prints mounted for reproduction with a maximum composite size of 8 x 10 inches. The purpose is to demonstrate your knowledge of the standard procedure and ability to match print quality.

E29

Prepare a fundus photography series of a standard diabetic survey. The purpose of this assignment is to demonstrate your operation of a fundus camera and your knowledge of standard techniques used in ophthalmology. Produce a color projection slide series which has been placed in a slide sheet for proper orientation.

E30

Prepare a fluorescein angiography series. Produce a paper or film contact sheet with indication of timing sequence and 3 or 4 enlargements of frames that illustrate the different phases. Each enlargement must be labeled as to its phase. The purpose is to show your ability to produce a standard fluorescein angiography series.

E31

Produce a slit-lamp photograph(s) of a tumor, vascular change or corneal lesion in a medium of your choice. The purpose of this assignment is to demonstrate slit-lamp photography techniques.

E32

Photograph the lower lingual and occlusal surfaces of at least 3 teeth, in a living subject, in which the lens axis bisects the interdental space. Produce a single projection transparency using composite duplicate techniques. The purpose of this assignment is twofold:

-- First, to demonstrate standard dental photography practices
-- Second, to demonstrate your ability with specialized duplication techniques.

E33

Produce four photographs showing full head views of traumatic repair, rhinoplastic, oculoplastic, dental osteotomy, orthodontic patient, etc. Produce in the medium of your choice. The purpose is to demonstrate your standardization in patient photography.

-- Front and lateral views before treatment
-- Front and lateral views after treatment

E34

A specimen photograph of a thick moist subject (e.g.: fresh lung, liver, spleen, kidney). Produce two illustrations in medium of your choice. The purpose is to demonstrate your ability to produce quality specimen photographs. Include a scale. (The choice of photographing the scale in the original image or applying it to the prints afterwards is left to the discretion of the candidate.)

-- The gross organ
-- A cut surface of the same specimen

E35

A detailed close-up photograph of a heart specimen which has the purpose of showing interior details of valves and/or trabeculae. Produce a color projection transparency or a color print.

E36

Photograph any specimen at xl on the film plane which requires transillumination as the main light source. Include a scale. Produce in medium of your choice. The purpose is to show your ability to resolve detail in low power photomacrography while obtaining proper illumination.

E37

Two views of mounted dentures or wax-ups of dentures on an articulator, or same for crown and bridge procedure on an articulator. Produce in medium of your choice. Image must include the entire articulator.

-- Front view in occlusion
-- Right or left lateral view in occlusion

E38

A photomacrograph at x2 to x5 of an animal (e.g.: moth, fish, mouse, spider, hummingbird, wasp). The subject must be living, unanesthetized and untranquilized. Produce in medium of your choice. The purpose is to demonstrate your ability to work with live subjects in a photomacrographic situation.

E39

A photomacrograph at x2 to x5 of an immobile subject (e.g.: moth collection specimen, postage stamp, tooth, forcible-entry marks, leaf). If possible submit original subject matter. Produce a

black & white print. The purpose of this assignment is to show crisp detail and good print quality.

E40

A photomacrograph at x10 to x25 that has the purpose of demonstrating optical and lighting techniques encountered with an opaque subject (e.g.: an insect head or back, fossilized material with venose structure, insect damage to bark, decay in an extracted tooth. Produce in medium of your choice.

E41

A photograph at xl0 to x20 of any subject which requires reflected and transmitted light simultaneously. Produce in medium of your choice. The purpose is to show your ability to control exposure and the use of two light sources.

E42

A photomicrograph at x200 to x450 of a tissue subject which requires an illumination other than bright field. Describe the principle of your illumination on your data sheet. Produce a color or black & white print that includes a scale. The purpose is to show your knowledge and application of specialized photomicrography lighting.

E43

Ultraviolet induced fluorescence **(visible light emission after UV excitation)** of any subject. Produce in the medium of your choice. The purpose is to demonstrate your knowledge of ultraviolet fluorescence photography. (This does not include a fluorescein angiogram.)

E44

Produce a continuous tone copy of an original photograph which has been appropriately labeled. Submit a black & white print and a transparency. Submit the original material. The purpose is to demonstrate your ability to reproduce detail and tonal scales and properly label a photograph to improve the educational value.

E45

Make three duplicate color transparencies from camera-original transparencies. Two of the original transparencies must be corrected for the following defects: (a) One full step underexposure; and (b) an obvious color balance defect. The third: (c) a transparency requiring a normal duplicate. Submit the original and duplicate transparencies. The purpose is to show

duplication techniques and the ability to utilize duplication techniques to correct or improve originals.

E46

Photograph a latent fingerprint lift that would be found at a crime scene, and the corresponding inked fingerprint impression of a suspect. Produce two black & white prints, which are mounted and labeled for courtroom use, showing at least seven points of comparison. The purpose is to demonstrate standard forensic photography techniques and produce photographs which can be used as evidence.

E47

Produce a creative public relations photograph to demonstrate your ability to produce an illustration that will have human interest to a lay audience. Produce a black & white print.

E48

Photograph a piece of equipment which has a cathode ray tube or a digital diode as an integral part of its control panel. The purpose is to photograph the object so that the piece of equipment is visible and the display is legible. Produce a color projection transparency or color print.

E49

Produce an interior architectural photograph to demonstrate your control of lighting and perspective. Submit a camera-original color transparency of 2 1/4 x 2 1/4 inches or larger.

E50

Produce an exterior architectural photograph illustrating structural or design detail. The purpose is to illustrate perspective and lighting control, use of filters, and the production of high resolution prints. Produce two black & white prints.

-- The architectural structure
-- 10x enlargement from a portion of the negative

E51

Produce a photograph of hand instruments or small tools which has been labeled to be used in training personnel or teaching students within your facility. The purpose is to demonstrate ability in subject arrangement and lighting to illustrate the items to their best advantage. Produce a black & white print.

E52

Produce two motion picture film sequences, each demonstrating a different special technique (e.g.: time-lapse, high speed [100 fps or more], timing, split-screen, cinemicrography. Total screening time for each sequence should be not less than one minute nor more than four minutes. Submit 16mm motion picture film only. The purpose is to show your ability to alter time using film techniques.

E53

Submit a release print of a film or video tape in which you played a significant role in the production. A detailed statement of the functions you had in the production must accompany this submission. The purpose is to show your ability to work with a team in producing a finished film. The film credits must substantiate this statement.

E54

Prepare a graph on a cel(s) using opaque or colored letters, tapes, and/or cel paint. Subject matter and style of your choice. The purpose is to demonstrate your ability to prepare overlay cels for motion picture or color slides. Photograph the cel over a background. Produce a color projection transparency. Submit the original.

E55

Produce a 30-second PSA (public service announcement) designed to air on broadcast television. The videotape should have public interest and should have a biological theme - for example, to feature a field in the health science profession, to promote better health habits, to raise public awareness of health care services in your community, etc. The purpose of this assignment is NOT to see if you can produce a videotape to a broadcaster's technical standards, but rather to see if you can produce an interesting tape that tells a story in a very short time frame.

E56

Submit planning sketches and scale drawings of a scientific exhibit or display which utilizes transparencies or models or both. Prepare a production cost analysis including personnel with specific expertise and vendor services necessary to complete the production, crating, shipping, and assembling at the meeting. Photographs of a scientific exhibit and a detailed statement of the functions you had in the production will fulfill the design aspect of this assignment. The purpose is to show your ability to work on scientific exhibits.

E57

Prepare a complete proposal and justification of a major piece of equipment for your media facility as though it would be submitted to your budget office. Include who would benefit from this purchase, cost analysis, method of purchase, maintenance costs, service proposals, location, physical plant modifications, samples using present techniques, samples from the new

equipment, demonstration reports and literature. The purpose is to show you can justify major purchases.
Proposal must include all requested elements.

E58

Using a slide scanner, flat bed scanner, or digital camera, capture an image and import it into a computer. Using appropriate software, enhance the image by removing distracting background, or labeling the image. Submit both the original and the enhanced version. Slides or prints are acceptable. Describe your technique on the data sheet.

E59 and E60 (two assignments)

Unspecified assignment relevant to your specialty of biophotography. The purpose of these two assignments is to allow submission of actual productions within your specialty. The assignment specification you received prior to executing the assignment must be stated on the data sheet. Produce in a medium of your choice. You may submit two different unspecified assignments. The requirements for these submissions must differ from the first 59 assignments, not simply be a repeat with different subjects.

THE ORAL EXAMINATION

Oral Examination Procedures

The Oral Examination phase of the Certification Program is conducted at **BIOCOMM -- The Annual Meeting of the Biological Photographic Association**.

The Practical Examination Coordinator will notify the candidate that he or she is being referred to the Oral Examination Board for the final step in the examination process. The candidate's practical portfolio will be returned to him or her prior to the Oral Examination.

The Executive Secretary will send a letter to the candidates which tells them when and where their Oral Examination will be conducted. The letter also instructs the candidate to bring his or her portfolio to the Oral examination. Included with this letter is a set of forms which asks for information that will be used in press releases. The candidate is also instructed to bring three (3) copies of a working portrait of themselves.

Preliminary Meeting of the Candidates

There will be a meeting of all the candidates the night before the Oral Examinations. The above mentioned letter from the Executive Secretary will give the candidate the time and place of this meeting. The purpose of the meeting is to relieve the candidates anxiety by providing an informal question and answer session between the candidate and the officers of the Board of Registry. It is important that each candidate for Oral Examination attend this meeting. The following events will occur:

The Executive Secretary of the Board of Registry will welcome candidates and introduce them to the Written Examination Coordinator, the Practical Examination Coordinator and the Oral Examination Coordinator.

The Executive Secretary will then collect the press release information and the photographs of the candidates as well as the portfolios which the candidates had been instructed to bring. The Executive Secretary will introduce the Chairman of the Board of Registry who will explain the procedures which will be used during the next day's Oral Examinations.

Composition of the Oral Board

The Oral Examination Board is comprised of five Registered Biological Photographers who are appointed by the Oral Examination Coordinator. One member of the Oral Examination Board must also be a member of the Board of Registry and it is this individual who will serve as Chairman of the Oral Examination Board. The remaining four members are RBPs who are not members of the candidate's local BPA chapter. These Rbp must have attended the Examiners'

Orientation Meeting and/or have served on Oral Examination Boards previously. The Chairman of the Oral Examination Board will preside over the examination and will determine the appropriate actions and procedures.

Responsibility and Authority of the Oral Board

It is the responsibility of the Oral Examination Board to assure the Board of Registry that a candidate has met all the requirements and is indeed qualified to be a Registered Biological Photographer. If the oral board, through its examinations, finds that a candidate is lacking in some respect, the Oral Board is empowered to fail that candidate and require that the Oral Examination be repeated at a later date.

Oral Exam Board Assignments

On the morning of the Oral Examination, the candidates report to the assigned room at the specified time.

The Oral Examination Coordinator will assign as many candidates as feasible to Oral Examination Boards.

Those candidates who cannot be assigned to an Oral Examination Board in the initial round will be asked to leave their room and telephone numbers and will be notified when an Oral Examination Board becomes available. This may not be for several hours. It varies with the number of candidates, but there are usually five Oral Examination Boards operating throughout the day. Each examination takes from one to two hours. It is rare, but on occasion this process has taken longer.

When an Oral Examination Board is available, the candidate will be called to return to the for the examination. The Oral Examination Coordinator informs the candidate who the members of his/her Examination Board will be. A candidate has the right to refuse one Oral Examination Board member on a preemptory basis, and will then be assigned another board.

It is the candidate's responsibility to inform the Oral Examination Coordinator before the Oral Examination commences of any conflict-of-interest that he or she may have with an examiner on the assigned Examination Board. If in the opinion of the concerned Board of Registry officers (Chairman, Executive Secretary and Oral Examination Coordinator) a conflict-of-interest does exist, a new Examination Board will be assigned.

The Oral Examination Begins

Once a candidate has been assigned to an Examination Board, the Executive Secretary will notify the candidate that the examination has started, ask the candidate to wait outside the appropriate examination room, and deliver the candidate's portfolio and the Oral Examination forms to the Chairman of the candidate's Oral Examination Board.

The five Examiners will first sign the Oral Examination form. The Examiners will then review the Practical Examination portfolio. The test scores for the Written Examination and Practical Examination will not be available to the Examiners. (These components of the examination process have been completed and passed by the candidate.) The portfolio is available to the Oral Examination Board so that the Examiners may become familiar with the candidate's work.

The Chairman of the Oral Examination Board will invite the candidate into the examination room, close the door, and no one will be permitted into the room unless invited by the Chairman of the Oral Examination Board.

The candidate is introduced to the Oral Examination Board members and asked to give a brief description of his or her background.

The Oral Examination consists of two separate components:

(1) an oral presentation and
(2) an oral test of ten questions.

Both components must be passed.

The Chairman will ask the candidate to make a l0 - 15 minute oral presentation. The presentation must be designed to use a single 35mm slide projector for visual support. The presentation must cover a subject from one of the following areas:

(a) personal specialization in biophotography
(b) photographic research conducted by the applicant
(c) an aspect of basic photographic theory
(d) administration of a biophotography service.

The Examiners expect a presentation which is professional in concept and execution, and a topic which lends itself to the use of well designed and produced visual aids.

Following the candidate's presentation, each Examiner may ask one question regarding the presentation. Each Examiner will grade the presentation according to the grading criteria provided. Quality of the oral presentation, visuals, organization and content will all be considered. The five grades will be averaged for a final grade. A grade of 70 passes.

After the oral presentation is completed, the second part of the Oral Examination will begin. The oral test consists of 10 questions (2 questions per Examiner) which are developed by

the Examiners (with the accompanying answers) prior to the candidate's arrival. Copies of the Certification Program Guide will be available to the examiners to facilitate question writing.

At least five questions that will be asked will come from the core knowledge areas. The Board of Registry feels that the candidate should have competency in these five broad areas:

(1) **Materials & Processes**: Questions from this area cover theoretical areas of biological photography, specifically: films, chemistry, light, filters, optics.

(2) **Practical Biophotography**: These questions may cover everyday applications of biophotography such as: lighting for clinical documentation, specimen lighting, flat and texture lighting, patient photography, OR photography.

(3) **Photomacrography/micrography**: These questions should test to see if the candidate has a basic working knowledge of the microscope, correct procedures for illumination, use of scales and print quality for publication.

(4) **Media**: These questions may cover planning and production, television, audio or other aspects of educational and communications media.

(5) **Reproduction Photography**: Questions pertaining to the photographic reproductions of different types of originals such as ECGs, radiographs, line originals and tone originals. Developer and film combinations for specific originals might also be considered.
The remaining five questions may be asked from any area deemed relevant by the examiners.

Each examiner scores the answer to each of the 10 questions posed to the candidate after which the Chairman will ask the candidate to leave the examination room.

The average score for each question is tabulated by the Chairman with the assistance of the other examiners. An average score of 70 is accepted as a satisfactory response. Seven of ten questions must be answered satisfactorily to pass this component of the Oral Examination.

If the candidate has failed one of the two components of the Oral Examination and the score for the component failed is greater than 60 (average score greater than 60 on the oral presentation; or average of the seven highest scoring answers on the oral test greater than 60) the Chairman of the Oral Examination Board shall ask the Board for discussion concerning the candidate. The discussion will be limited to 20 minutes, at which time the board will vote on the candidate's suitability for certification. Certification requires four affirmative votes.

The Executive Secretary will act as the candidate's representative to the Oral Examination Board if questions or problems arise, and will answer questions and provide information requested by the Examination Board. The Executive Secretary will determine whether it is necessary to request the assistance of the Practical Examination Coordinator.

If the candidate has passed the examination, the Executive Secretary will have members of the Examination Board sign the candidate's certificate. The Chairman then will invite the

candidate back into the room and announce the results of the examination. The Board of Registry will then present the candidate with an appropriate emblem to be worn during the meeting, marking his or her status as a new Registered Biological Photographer.

If the candidate is unsuccessful, the Chairman must give an explanation and recommendations to the candidate. Counseling sessions are arranged where possible.

All records are then returned to the Executive Secretary and, if necessary, a discussion of recommendations to be made takes place.

Inscribing the Registry

The Executive Secretary of the Board of Registry is responsible for maintaining the Registry. This is the official list of all Registered Biological Photographers. After the Oral Examinations are over, the Executive Secretary inscribes the names of all those who passed their Oral Examinations. The Executive Secretary then acquires the remaining signatures on the certificates and affixes the Seal of the Biological Photographic Association.

Exceptional Situations

In the event that a candidate cannot travel to the annual meeting of the Biological Photographic Association to be examined, the candidate may request (in writing) to the Chairman of the Board of Registry that an Oral Examination Board be assembled other than at the Annual Meeting. This request must detail why the candidate is unable to attend the Annual Meeting.

The Chairman of the Board of Registry is empowered to convene a special Oral Examination Board closer to the candidate's area. The composition of this specially convened board must be the same as an Oral Examination Board at the Annual meeting; i.e., the Executive Secretary and one other member of the Board of Registry to serve as the Chairman of the Oral Examination Board and four RBP Examiners who are not members of the candidate's local BPA chapter. If expenses are incurred, the candidate must bear the cost of convening of such an Oral Examination Board. Because of these requirements, it is highly recommended that every candidate make every attempt to be examined at the annual meeting.

Oral Examination Procedure Check List

(For use by Oral Examination Board Chair and Members)

The Oral Examination consists of two components:

1) Oral Presentation
2) Oral Exam

Each component of must be passed with the minimum grade of 70. Both components must be passed for the candidate to become a Registered Biological Photographer. This checklist and accompanying forms are provided to help examinations to be conducted in an efficient and consistent manner.

Oral Examination Forms Package
- Current certification program guide
- Oral examination procedure check list
- 5 copies “Oral Examiner’s Grade Forms for Oral Presentations”
- 5 copies “Oral Examination Grade Form”
- 5 copies “Oral Examiner’s Q&A Form”

The Candidate’s Portfolio

The 18 required and 12 elective assignments included in the Practical Examination Portfolio are provided to the Oral Examination Board for review and use in development of appropriate questions. This review and development phase should take approximately one half hour.

The Candidate’s Written and Practical grades will not be available to the Oral Examiners. The Candidate has already passed both the Written and Practical part of the Examination process.

The portfolio is in the room and should be reviewed by all Examiners so that the Examiners are able to become familiar with the Candidate and his or her work. Remember, the Oral Examiner’s job is not to re-grade the portfolio. This has been done and the Candidate has passed.

The portfolio is provided so that the Examiners are able to become familiar with the Candidate and his or her work. Questions may be asked about the portfolio but these must be a component of the 10 question examination component and must documented on the Q&A form.

Development of Questions for the Oral Examination

As the Examiners review the portfolio, they may develop and record questions pertaining to the portfolio. Additionally, five questions relating to the “core areas” must be developed. Discussion of questions among examiners is encouraged to eliminate duplication.

The Oral Examination component will consist of 10 questions (Each Examiner is required to ask two questions) developed by the Examiners, with the accompanying consensus answers recorded prior to the Candidate’s arrival on the “Oral Examiner’s Q&A Documentation Form”. Questions may address problem solving, technical knowledge and hypothetical situations.

Sample Questions:

1) On a microscope objective, what does the word "plan" mean?
2) How would you light a certain type of specimen, and what would be a good choice of film for a specific assignment?
3) A 50mm lens of normal optical design is not as sharp at f2.0 as it is at f8.0. What optical phenomena explains this? Briefly, describe this phenomena.

Remember the questions should not be developed to trick the Candidate but should be developed to help the Examiner decide if the applicant is fully qualified.

When all Examiners have completed their examination of the Candidate's portfolio and development of questions, the Chairperson will notify OREXCO that the Oral Examination Board is ready to receive the Candidate.

The Examination

The OREXCO or Executive Secretary will escort the Candidate to the examination room and introduce him or her to the Chairperson and the Oral Examination Board members.

The Chair will ask each of the Examiners to introduce themselves to the Candidate, and ask the Candidate to present a complete brief biographical sketch of his or her professional experience

This "get-acquainted" time allows the Candidate an opportunity to relax and to become familiar with the Examiners' backgrounds.

Oral Presentation

The Chair will ask the Candidate to present their required 10–15 minute oral presentation. **If the Candidate has not completed their presentation within the 15 minute time period, the Chair of the Oral Examination Board will inform the Candidate that they must finish within the next minute.** Points will be deducted for going over or under the time allotted. The presentation must cover a subject from one of the following broad areas:

a) Personal specialization in biophotography,
b) Photographic research conducted by the applicant
c) An aspect of basic photographic theory
d) Administration of a biophotography service.

The Examiners will use the "Oral Examiner's Grade Form for Oral Presentations" that is provided. Each Examiner may ask one question about the Oral Presentation. The Candidate's presentation will be graded on the four listed criteria. The scores are totaled and averaged to determine the Examiner's final grade for the Oral Presentation. The grades of the five Examiners are averaged to determine the overall grade. An average grade of 70 or above is passing.

Examiner Questions

The Examiner to the Candidate's right will begin the Question & Answer phase of the examination. Each Examiner will ask two questions. Remember, one question must cover each of the core areas: Material and Processes, Practical Biophotography, Photomac/Photomic, Media and Reproduction Photography. All the Examiners will be grading each question. Examiners should document the Candidate's answers.

High and low grades are discarded and remaining grades are averaged. The minimum satisfactory grade is 70. The Candidate must pass seven out of ten questions.

Completion of the Oral Examination

When all Examiners are through asking questions, the Chair of the Oral Board will escort the Candidate to the appropriate waiting area and notify OREXCO that the Oral Board is reviewing the Candidate's examination scores.

Tellers

The Chairperson will total and calculate the Oral Presentation and Examination grades. The grades are reviewed by the Chair to ensure their accuracy, and the final score presented to the Oral Examination Board Members.

The Candidate must pass both parts of the Oral Examination phase; the oral presentation and the oral examination. Both grades must be 70 or above for a passing grade. The Chair will notify OREXCO of the results and ask OREXCO to escort the candidate back to the examination room.

The Chair shall announce the results of the Oral Examination to the Candidate.

Successful Candidates

If the Candidate is successful, OREXCO will submit the Candidate's name to the Executive Secretary for inclusion into the records of the Board of Registry of the Biological Photographic Association, Inc. as a Registered Biological Photographer.

Unsuccessful Candidate

If the Candidate is not successful, OREXCO will be called into the room and informed by the Chair of the failing grade. OREXCO will then escort the Candidate into the room and the Chair will announce the examination score to the Candidate. OREXCO will provide the Candidate with a copy of the average scores as soon as practical and offer the Candidate assistance through the resources of the Board of Registry to help the Candidate prepare for a future oral examination.

The Chair may suggest and conduct an optional counseling session with the candidate's approval.

ORAL EXAMINER'S GRADE FORM FOR ORAL PRESENTATIONS

90 – 100	Very Good to Outstanding Work
80 – 89	Very Good Work, minor faults
70 – 79	Marginal to Fair Work
60 – 69	Not Acceptable
0 – 59	Extremely Poor Work

EXAMINER: _____

ORAL PRESENTATION:

1. Quality of Oral Presentation: Is the speaker intelligible? Is the choice of language and terminology clear and appropriate? Does the candidate stay within the allotted time? Was the candidate able to give the correct response to questions pertaining to the oral presentation?

Grade _____

2. Quality of Visuals: Does the candidate effectively use visual support material? Are the materials of good quality? Have the visuals been carefully planned? If visual information is an important part of the data, are the relevant features clearly visible?

Grade _____

3. Quality of Organization: Does the presentation proceed in a straight forward, understandable sequence? Does the conclusion flow naturally from the information and methodology presented?

Grade _____

4. Quality of Content: Was the subject matter appropriate and was it well researched? Was it complete and thorough considering the time allotted (10–15 min)?

Grade _____

Total _____

Avg _____

FINAL GRADE _____

Each examiner is allowed one question, and only one question.

MISCELLANEOUS

Biological Photographic Association, Inc.

In 1931 twenty-eight scientific photographers met at Yale University to exchange technical information and ideas on the application of photography in the health and natural sciences. These photographers founded the Biological Photographic Association (BPA) and gave biological photographers a solid foundation upon which they were able to build a recognized profession.

Today the BPA is an international professional organization whose mission is to achieve preeminence as a source of education and expertise for all users and producers of visual communication media in the life sciences. Every program sponsored by the Association is directed towards this end. The Association pursues this goal through varied means by sponsoring workshops, publication of the Journal of Biological Photography, a network of regional and local chapter meetings, the annual BIOCOMM international meeting and other programs.

For many years BPA has conducted educational programs which address the needs of visual communications professionals; from newcomers to the profession, to those who wish to refresh their knowledge and experience, to those who require advanced programs designed to provide higher level technological currency in this rapidly developing field.

Chapter meetings and regional conferences are held regularly during the year, and annual meetings of the Association are held for the presentation of scientific papers, workshops, panel discussions, and scientific and commercial exhibits.

Membership

Membership in the Association's 24 chapters in the United States and Canada is over 1200, and there are numerous members-at-large in countries throughout the world.

Active members of the Association are regularly employed in the field of biological photography or employ biophotography extensively in their work. Student members of BPA are enrolled in recognized educational programs of biophotography or in science programs and have taken a keen interest in biophotography. Sustaining membership is open to corporations and institutions who wish to support BPA programs.

Annual Meetings

The Biological Photographic Association conducts its annual meeting — known as BIOCOMM — each summer. Over 60 such meetings have now been completed. The annual meetings provides an opportunity for the association to conduct its business by holding meetings of The Board of Governors, The Board of Registry (including the Oral Examination Boards), The House of Delegates, and the Annual Business Meeting.

Beyond business, the BIOCOMM offers all biophotographers the opportunity to attend workshops, several days of scientific paper presentations, panel discussions, poster sessions, a professional exhibition of still and motion media work, commercial exhibits and the Awards Banquet.

BIOCOMM is held in a different city each year. For more information about the next meeting contact the Executive Director of the Biological Photographic Association.

Awards

Awards are conferred annually for the best scientific paper published in the Journal of Biological Photography and for the best oral paper presented at the Annual Meeting. Also, outstanding contributions to exhibits of still and motion picture photography and of videotapes are recognized annually.

Other awards and honors include Fellowship, the President's Service Award, and the Louis B. Schmidt Award for sustained service to BPA and contributions to biophotography.

Professional exhibitions of prints, slides and motion media are held at annual and chapter meetings to encourage the advance in technical and informational quality of biophotographic work.

Journal of Biological Photography

The chief purpose of the **Journal of Biological Photography** (published quarterly by the BPA) is to disseminate information on practical applications of the increasingly complex and sophisticated techniques and equipment used by biological photographers and other communications specialists working in the health and natural sciences. The Journal thus contributes to the advancement of scientific communications by offering a medium for sharing with other members of the profession the knowledge and experience gained through research and practical work. The information in it often is not found elsewhere. The Journal is fully indexed and found in many libraries.

BPA also publishes the BPA NEWS to inform members about chapter activities, fellow workers in the news, conferences, courses, changes, deadlines and matters of importance involving the RBP program, publications, and employment opportunities for biophotographers. As a candidate in the Certification Program, you will receive the BPA NEWS regardless of your BPA membership status.

Training and Education

Some institutions, universities and local hospitals offer on-the-job training in biological photography. Several degree based programs in biophotography and communications exist at colleges and universities. Excellent seminars and workshops are conducted by BPA each year.

For further information about the Biological Photographic Association and its various programs, contact the Association offices at:

Biological Photographic Association, Inc.
1819 Peachtree Street, N.E.
Suite 620
Atlanta, GA 30309

Telephone: (404) 351-6300
Telefax: (404) 351-3348
Jobs Hotline: (404) 717-4968
E-mail Assnhq@Mindspring.Com

Registered Biological Photographers

(RBP) as of July 1994

Albright, Robert F.
Aldrete, Ray E.
Allan, Garry W.
Armstrong, William
Atkinson, William H.
Austin, Kerri

Bailey, Charles M.
Baitz, Harold C.
Baldwin, E. Lynn.
Barber, Janet
Barber, Patricia
Barker, Norman J.
Baumann, Merril G.
Bawden, Eric J.
Beck, Marian
Bednarek, Thomas
Bellows, Robert B.
Benjamin, Alfred
Berriman, Martha D.
Blaker, Alfred A.

Blikenstaff, John E.
Bolleter, M. Wayne

Boni, Jeffrey M.
Bowden, Arthur J.
Bowens, Bruce
Bowerman, Leland M.
Bowman, Raymond C.
Boyer, Raymond
Brook, Gerald A.
Brooks, Percy W.
Brown, Laurence B.
Brown, Robert A.
Brownell, Charles G.
Buckley, Kenneth.
Budka, Rosamond K.
Bundrick, Glen H.
Burch, J. Lindsey
Burlingame, Craig A.

Caliendo, Marilee
Carter, Richard F.
Cheney, Maynard C.
Christenson, LeRoy P.
Christopher, Ronald M.
Clark, Richard L.
Clucas, Diane
Cockerill, James W.
Coffey, Lardner A.
Conde, Theodore M.
Cook, George
Cooper, Adam
Conley, Perry L.
Crawford, J. Richard
Criss, Warren R.
Cristofaro, Carmin N.
Cunningham, Denise

Dant, J. Robert
David, Robert E
Davis, Gene K.
Davis, S. Jack
DeBlois, John D.
DeBruin, Jack P.
DeLeon, April A.
Denner, Jordan F.
Deutsch, Charles J.

DeVeer, William H.
Dewitt Richard
Dillard, Albert E.
Dobihal, Scott
Dodge, Timothy P.
Dommasch, Hans S.
Drake, William A.
Dubs, Frederick
Dunton, Samuel C.

Eastman, Wynne S.
Ebbett, Shelley
Edwards, Otis T.
Ehlin, Marvin
Eichling, Thomas
Elbogen, Martin
Elford, William
Engel, Charles E.
Engstrom, Donald
Eskew, John
Eswine-Smouse, Susan

Facto, Louis A.
Farmer, John
Fason, Jack
Fischler, Herbert A.
Flora, Kenneth
Ford, John E.
Ford, Homer D.
Ford, Robert J.
Fosse, James M.
Francis, Charles E.
Fraser, William A.
Freehe, Clifford L.
Friedmann, Harold
Fritts, Donald H.

Galbraith, Jan Rene
Garneau, Jean
Gaughan, John A.
Gauthier, Garreth
Gauthier, John M.
George, Terry W.
Gero, Andrew J.
Giannavola, Samuel
Gibson, Daniel A.

Gibson, H. Lou
Giguere, Marc
Gilliam, Cecil D.
Gilliam, Luther R.
Gjersvik, Torleif
Glaser, Jane K.
Glazier, Ralph M.
Gold, John A.
Gonzalez, Fernando G.
Goodman, Leo
Grattan, Peter
Graver, Nicholas M.
Gravesen, Alex A.
Gray, Carol (Asimow)
Gray, David E.
Greenberg, Wilfred
Greenwood, Paul C.
Gushul, Evan T.

Halpern, Steven
Hansell, Peter
Hansen, David S.
Hart, Leonard M.
Havel, Dennis A.
Hayden, James E.
Hayes, Janet
Heard, Gloria J.
Hedgcock, Charles A.
Heitlinger, Lester
Helmer, Norman C.
Henderson, James
Hendrix, John B.
Henning, Rudolph J.
Herman, Richard
Herskovitz, Antol H.
Hetmanski, Kenneth F.
Hilbrand, David
Hodge, Charles P.
Hood, Thurmen Jr.
Hootnick, Harry L.
Hough, Connie
Howze, T. Mark
Hyink, Paul A.
Hyland, Dorothy

Ikenberg, Maria

Irvine, Ronald F.

Jacobsen, Mary
Jacobson, Marjorie E.
Jarkut, Dieter F.
Jerry, Norman L.
Johnson, Melvin P.
Johnson, Paris C.
Jones, Jeffrey W.
Joseph, Edward A.
Julian, Alvin P.
Julin, Leonard
Junor, John M.

Kantor, Nathan C.
Karkut, Dieter F.
Karraker, Robert O.
Karras, Maria
Kendrick, James P,
Kennedy, Dale
Kerr, Carol E.
Kilbourne, C. Scott
Kindell, William A.
Kissane, Michael
Klosevych, Stanley
Knight, Dixie
Kondreck, Martin
Konikiewicz, Leonard
Koster, Lewis W.
Kostuk, Kenneth P.
Kovacs, Ronald
Krzemien, Leon J.
Kuharic, Patricia
Kulmann, Richard W.
Kuykendall, John D.
Kuzma, Anthony M.

Landi, Victor R.
Lanier, Thomas W.
Lannon, Thomas J.
Lappan, Joseph T.
Larson, Eric
Larsson, Carl G.
Lawton, Edwin A.
Leapley, McKinley
LeCover, Maurice

Lee, Wilfred
Levin, Albert
Levy, David W.
Lewis, Terri
Liesner, Karl H. F.
Little, Frank David
Linlel, Robert D.
Lopez, Richardo F.
Lown, Wilbour C.
Lund, Raymond E.
Lungershausen, Arnold
Luther, Jerry D.

Maciejewski, T. V.
Makowski, Kevin J.
Mallory, Francis C.
Mangan, John J.
Maradik, Michael A
Marquardt, Walter G.
Marshall, Margaret
Martin, Lauren
Masser, Mark E.
Massey, William D.
Masterson, Thomas S.
Matlovsky, I. Lloyd
Matthias, Richard C.
Mauer, John A.
Maxcy, Gordon W.
McClure, Richard G.
McComb, Stanley J.
McCormick, James F.
McDermott, Eugene
McDonald, E. Alexander
McGregor, Kenneth N.
McKim, James W.
McKnight, Robert J.
McWilliam, Leslie H.
Meats, Kenwyn
Medcalf, Peter L.
Mentrikoski, Joseph
Merin, Lawrence M.
Meyer, John Stefan
Michael, Stephan W.
Miller, Luvenia C.
Miller, Paul K.
Mills, Patricia J.

Minello, Frank G.
Mineo, Joseph E.
Momchilov, Cindy S.
Moore, Bernard J.
Moore, Clark D., Jr.
Montesino, Braulio
Morton, Ben D., Jr.
Moyer, Foster E.
Mucha, Alex V.
Muldowney, John C.
Murray, Ronald J.

Newby, John R.
Newman, Donald A.
Newman, H. Paul
Nichols, Louis W.
Nicotera, Douglas
Novarro, Julio
Nyberg, William Carl
Ollerenshaw, Robert
Oswald, Raymond M.

Paglialunga, Albert
Palkuti, Gabriel A.
Park, Franklin E.
Parker, Gordon H.
Parobek, Jere
Parrish, Lewis
Patton, Dan R.
Peck, Chris
Peck, Virginia A.
Pedigo, Louis S.
Pepin, Ada M.
Peres, Michael
Pickett, Morris J.
Pinkham, Dorothy
Pitre, Ronald
Polchow, Cindy
Poppel, Joseph
Poynter, Frank J.
Pulschen, Harry K.

Quirk, Michelle

Raddatz, Mary
Radzyner, Howard J.

Rakiewicz, Bronislaw
Raphael, Henry M.
Ratajczak, Stanislaus B.
Ray, Richard H.
Reather, Chester F.
Reid, Peter
Reindl, Frank J.
Reiner, Charles G.
Reis, George W. A.
Renner Wilmer E.
Retherford, D. Gary
Rex, Donald
Reynolds, Lawrence R., Jr.
Richter, Harold H.
Riedlinger, Robert C., III
Roddick, Dale E.
Rogers, Randy L.
Root, Nile
Rudnicki, Ludwik
Ruffcorn, Wayne G.
Russell, Anne
Ryan, Eugene

St. Laurent, Lucien R.
Salb, Bernard F.
Sampley, Stephen R.
Schleickhorn, Henry
Schmidt, Warren
Schonzeit, Ronnie Sue
Schwerk, Irene
Scott, James R.
Scott, Richard C.
Shaffer, C. Allen
Shapiro, Sidney
Sharp, Frederick T.
Sheldon, Janice
Shemilt, Janey
Sherman, Christopher
Sherrill, Claude, Jr.
Shockey, Stanley A.
Showstark, Paul J.
Silver (Facto), Helen
Sinclair, Kenneth G.
Sisson, Robert F.
Sleezer, Robert
Slone, Harold E.

Smialowski, Arthur
Smith, Pegg
Smith, Robert F.
Smith, William G., Jr.
Spitaleri, Rose Marie
Spitzer, Alfred M.
Stambaugh, Debi
Stanley, Gordon
Stephenson, Wade F.
Stokes, Marshall
Stone, Roger W.
Stringer, John T., Jr.
Strong, Hal M.
Sturgis, Warren
Sullo, Francis Joseph
Swanson, Eric
Swartz, John J.

Tanis, George N.
Tankersley, Kelly L.
Taylor, William J.
Teske, Mark
Thomas, Harold A.
Tilly, Dale A.
Todesco, James F.
Tracey, Rick
Tribe, Howard E.
Tuller, Roy
Turkington, Barbara L.
Turner, Robert C.
Tun, William
Udall, Carl A.
Upenieks, Harry

Van Rensselsaer, James
Veland, Brenda
Vetter, John P.
Vick, Robert E.

Waddell, Boyd
Waldeck, Robert F.
Wallace, Francis D.
Walzer, John S.
Watson, Robert G.
Webb, Judith
Webb, Lew

Webb, Terry L.
Weber, Julius
Wee, John A.
Weinberg, Allen E.
Weinreb, Stanley
Weiss, Carroll H.
Weiss, Saul M.
White, Maxine P.
Whitman, J. Douglas
Willard, Floyd L.
Williams, Wayne C.
Willner, William A.
Willoughby, David C.
Wipplinger, Walter
Wolf, Robert D.
Wong, Donald
Wood, Kent
Wood, Robert B.
Wood, Thomas L.
Yakiwchuk, Justin N.
Yamamoto, Verlin Y.
Yeager, Donald M.

Zacher, John F.
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